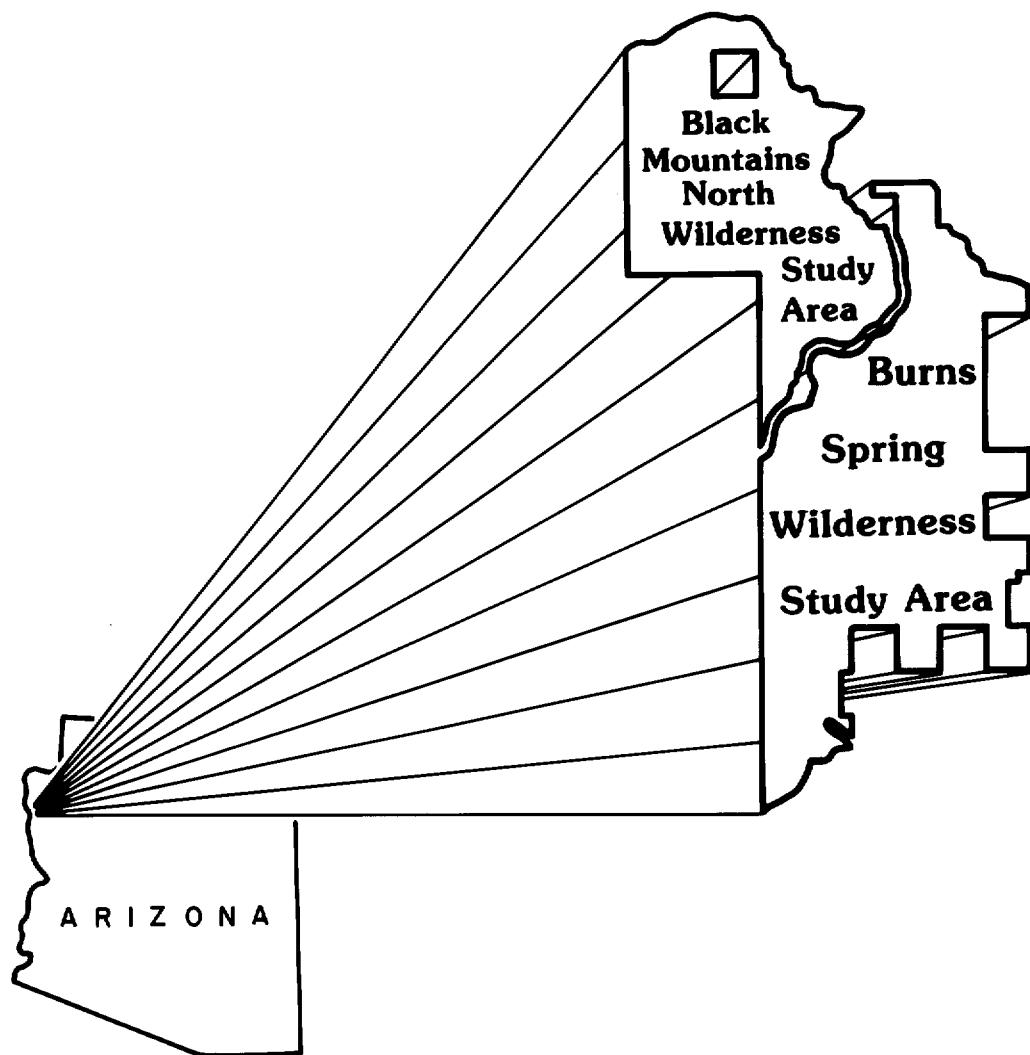


MLA | 1-89

Mineral Land Assessment
Open File Report/1989

**Mineral Resources of the Black Mountains North
(AZ-020-009) and Burns Spring (AZ-020-010)
Wilderness Study Areas, Mohave County, Arizona**



BUREAU OF MINES
UNITED STATES DEPARTMENT OF THE INTERIOR

MINERAL RESOURCES OF THE BLACK MOUNTAINS NORTH (AZ-020-009)
AND BURNS SPRING (AZ-020-010) WILDERNESS
STUDY AREAS, MOHAVE COUNTY, ARIZONA

by

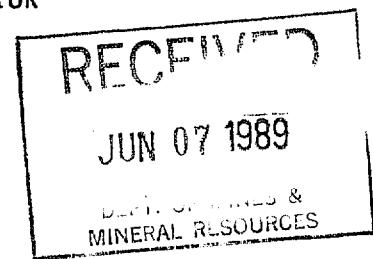
John T. Neubert

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1989

Intermountain Field Operations Center
Denver, Colorado

UNITED STATES DEPARTMENT OF THE INTERIOR
Donald P. Hodel, Secretary

BUREAU OF MINES
T S Ary, Director



PREFACE

The Federal Land Policy and Management Act of 1976 (Public Law 94-579) requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine mineral values, if any, that may be present. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral survey of the Black Mountains North (AZ-020-009) and Burns Spring (AZ-020-010) Wilderness Study Areas, Mohave County, Arizona.

This open-file report summarizes the results of a Bureau of Mines wilderness study. The report is preliminary and has not been edited or reviewed for conformity with the Bureau of Mines editorial standards. This study was conducted by personnel from the Resource Evaluation Branch, Intermountain Field Operations Center, P.O. Box 25086, Denver Federal Center, Denver, CO 80225.

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

°	degree
°F	degree Fahrenheit
ft	foot
in.	inch
kg/m ³	kilogram per cubic meter
mi	mile
meq/g	milliequivalent per gram
oz	troy ounce
ppb	part per billion
ppm	part per million
%	percent
lb	pound
oz/st	troy ounce per short ton

MINERAL RESOURCES OF THE BLACK MOUNTAINS NORTH (AZ-020-009)
AND BURNS SPRING (AZ-020-010) WILDERNESS
STUDY AREAS, MOHAVE COUNTY, ARIZONA

by

John T. Neubert, Bureau of Mines

SUMMARY

The Black Mountains North and Burns Spring Wilderness Study Areas (WSA's) comprise 19,900 and 30,600 acres, respectively. The areas are Bureau of Land Management administered land in the Black Mountains of northwestern Arizona. During the spring of 1987, the Bureau of Mines conducted a mineral investigation requested by the Bureau of Land Management and authorized by Public Law 94-579, October 21, 1976.

The Black Mountains are Precambrian-age igneous and metamorphic rocks overlain by Tertiary-age volcanic rocks and Quaternary-age sediments. Brecciation, fracturing, and low- and high-angle faults, possibly related to a detachment zone, are common.

The Virginia mining district extends into the northern Black Mountains North WSA, and the Union Pass (Katherine) mining district includes the southern tip of the Burns Spring WSA. Production from within the study areas, if any, has been small.

The Black Mountains are in a region of active gold mining and exploration. The Portland Mine, between the WSA's, is an open-pit mine currently producing gold. The north-trending quartz-calcite vein at the Portland may extend into either or both study areas. Altered rhyolite within both WSA's northeast of the Portland Mine has anomalous gold concentrations. Drilling, planned for mid-1989 may reveal economic concentrations, possibly at the Precambrian-Tertiary contact. The south end of the Burns Spring WSA

is mineralized with gold at the surface and subsurface. Indicated subeconomic resources of 3,280,000 tons of 0.0152 oz/st gold ore have been identified by drilling at Gold Chain Hill, adjacent to the study area. Within the study area, shallow drilling has encountered widespread, subeconomic gold concentrations. Additional drilling could reveal blocks of ore-grade material. The northern part of the Black Mountains North study area has a gold-bearing calcite vein which may be a target for future exploration. Drainages on the western slope of the Black Mountains North study area carry gold. The source of the gold could be extensions of structures from the Portland Mine or Virginia district; or the gold may be disseminated in the Tertiary volcanic rocks. Further exploration could determine if the gold occurrence is economic.

Inferred subeconomic resources of 180,000,000 tons of zeolites and 20,000,000 tons of perlite exist in both WSA's. The most accessible beds are low to medium quality. Higher quality zeolites and perlite may be present in the WSA's.

INTRODUCTION

In February and March of 1987, the Bureau of Mines, in a cooperative program with the U.S. Geological Survey (USGS) studied the mineral resources of the Black Mountains North (AZ-020-009) and the Burns Spring (AZ-020-010) Wilderness Study Areas, Mohave County, Arizona, on lands administered by the Bureau of Land Management (BLM). The Black Mountains North WSA comprises 19,900 acres; the Burns Spring WSA comprises 30,600 acres.

The Bureau studies and surveys mines, prospects, and mineralized areas to appraise reserves and identified subeconomic resources. The USGS assesses the potential for undiscovered mineral resources based on regional geological,

geochemical, and geophysical surveys. This report presents the results of the Bureau of Mines study. The USGS will publish the results of their studies. A joint USGS-Bureau report, to be published by the USGS, will integrate and summarize the results of both surveys.

Geographic setting

The Black Mountains North and Burns Spring WSA's cover 50,500 acres of the Black Mountains of Mohave County in northwestern Arizona. The WSA's are separated by an unpaved road and the open-pit Portland gold mine (fig. 1). Lake Mead National Recreation Area adjoins the areas to the west. U.S. Highway 93 is about 8 mi east and State Highway 68 is about 3 mi south of the WSA's. Cottonwood Road forms the northern boundary of the Black Mountains North WSA. Unpaved roads and jeep trails provide access to much of the WSA's, however, the western boundary of Black Mountains North and the southeastern boundary of Burns Spring are inaccessible to vehicles.

Laughlin, Nevada, and Bullhead City, Arizona, are about 6 mi south, and Kingman, Arizona, is about 20 mi southeast of the WSA's. Las Vegas, Nevada, is about 60 mi to the northwest.

Topography in the WSA's varies considerably. From the crest of the Black Mountains eastward the terrain is generally rolling with gentle slopes. West of the crest, the relief is dramatic; steep slopes and deeply incised canyons are common. Elevation in the areas ranges from about 4,250 ft at the crest along the southeast boundary of the Burns Spring WSA to about 1,320 ft at the southern tip of the Burns Spring WSA.

Previous studies

Parts of the Black Mountains are included on reconnaissance geologic maps by Wilson (1959) and Longwell (1963). A more detailed map may be published in

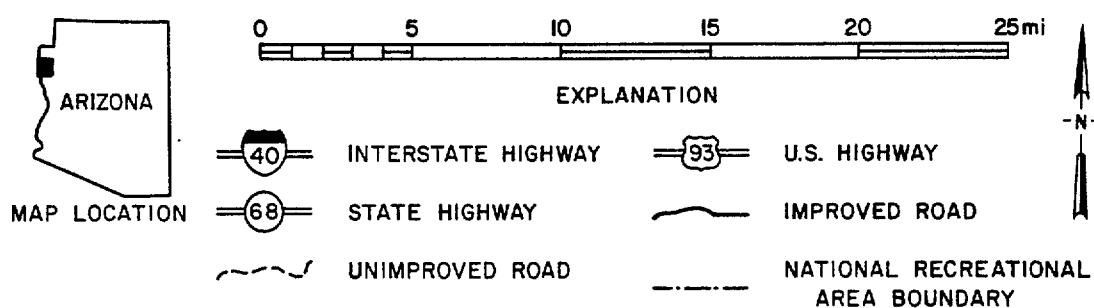
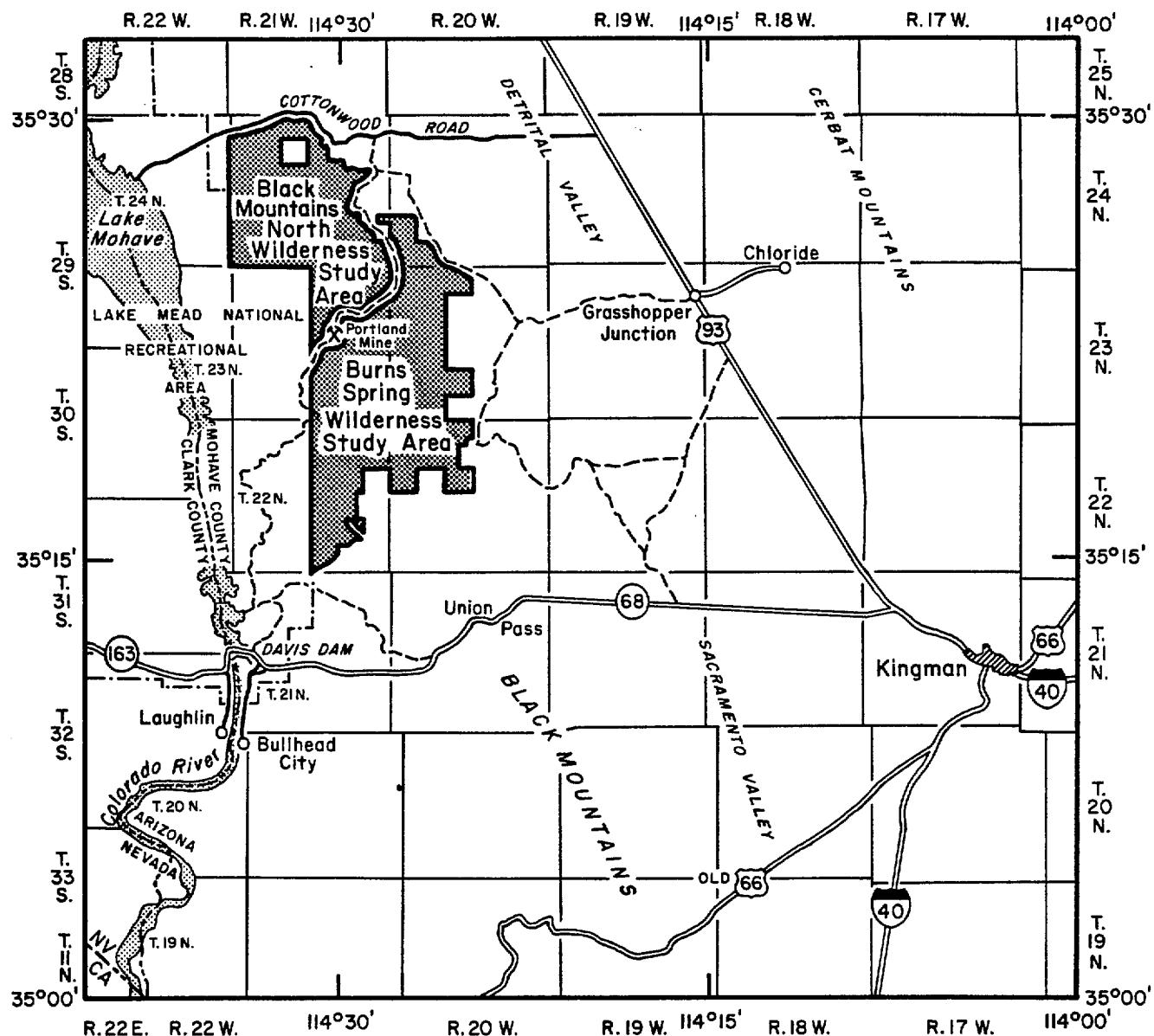


Figure 1.--Index map of the Black Mountains North and Burns Spring Wilderness Study Areas, Mohave County, Arizona.

the near future (F. L. Hillemeyer, geologist for Fischer-Watt Gold Co., Inc., personal commun., 1987). The mines of the Katherine district, near and within the southern part of the Burns Spring WSA, are discussed by Lausen (1931). The older mines in northwestern Arizona, including the mines in the Black Mountains, are described by Schrader (1909). The Portland Mine, located between the WSA's, was examined by Gardner (1936). Both WSA's are included in a geology, energy, and mineral report done under contract to the BLM (Great Basin GEM Joint Venture, 1983).

Present investigation

Prior to the field investigation, a background search of published and unpublished reports and Bureau of Mines files was made to gather data pertinent to the geology and mining history of the WSA's. Bureau of Land Management files were searched for mining claim and lease information.

Field work required 66 employee-days and included examining and sampling mineralized areas, mines, and prospects in the WSA's and within 1/2 mi of the WSA's boundaries. Mining company geologists working within or near the WSA's were interviewed for their knowledge of the mineralization of the Black Mountains.

Rock, panned-concentrate, and minus-80-mesh stream-sediment samples were taken to determine the extent of mineralized areas. Perlite and zeolite samples were tested for suitability for various industrial uses. A total of 213 rock, 35 panned-concentrate, and 34 stream-sediment samples was taken.

Most samples were analyzed by neutron activation for gold, silver, and 33 other elements by Bondar-Clegg, Lakewood, Colorado. Five perlite samples were tested by The Perlite Corporation, Chester, Pennsylvania; eight zeolite samples were analyzed by CSMRI-Analytica, Inc., Golden, Colorado.

Acknowledgments

The author thanks Charles Williams and Jim Woods of Western States Mineral Corp.; Fred Humphrey and Jack Hamm of Combined Metals Reduction, Co; Perry Durning and Bud Hillemeyer of Fischer-Watt Gold Co., Inc; Pete Drobeck, consultant; and Bob Harrison of the BLM for their information regarding the geology and mining activity in the study areas. In addition, special thanks go to Bill Hamilton, local rancher, for his help in locating obscure mine workings.

Land Status

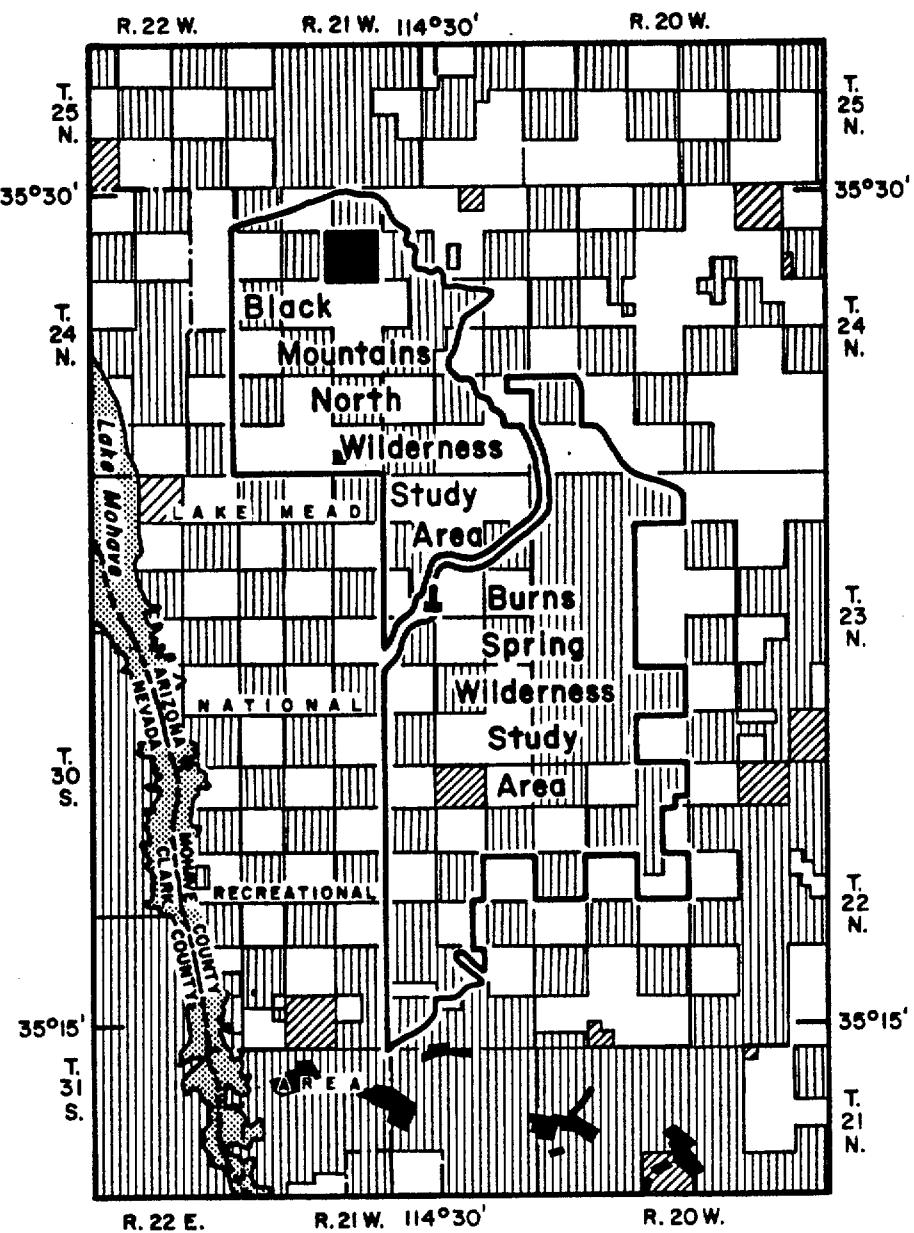
With the exception of a few isolated parcels, the surface of the WSA's is federally owned (fig. 2). The mineral rights within the WSA's are a more complex situation. Santa Fe Railroad and other private parties own the mineral rights to approximately 60% of the Black Mountains North WSA. Mineral rights in the Burns Spring WSA are about 65% federally administered; the other 35% owned by Santa Fe, the state of Arizona, and other private owners.

Oil and gas

Oil and gas leases cover parts of both WSA's (fig. 3), but no activities relating to oil and gas production were observed in or near the WSA's. Petroleum potential in the WSA's is rated low to zero because of the large exposures of Precambrian rocks overlain by Tertiary volcanics (Ryder, 1983, p. 19). Neither source rocks nor reservoir rocks are known to occur in the study areas.

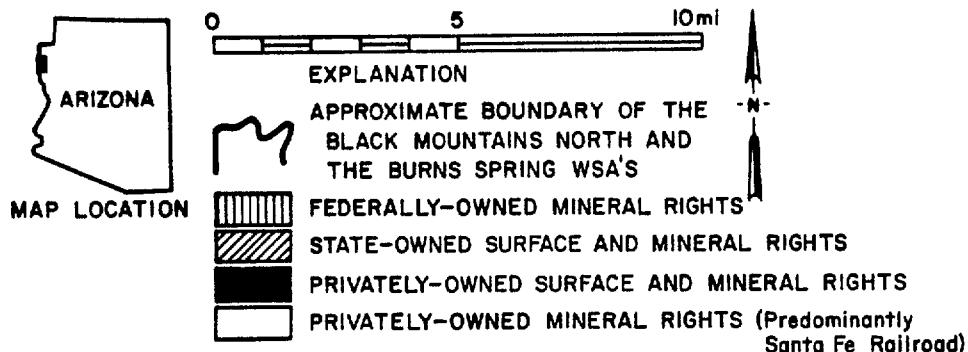
GEOLOGIC SETTING

The Burns Spring and Black Mountains North Wilderness Study Areas are in the Black Mountains of northwestern Arizona within the Basin and Range physiographic province.



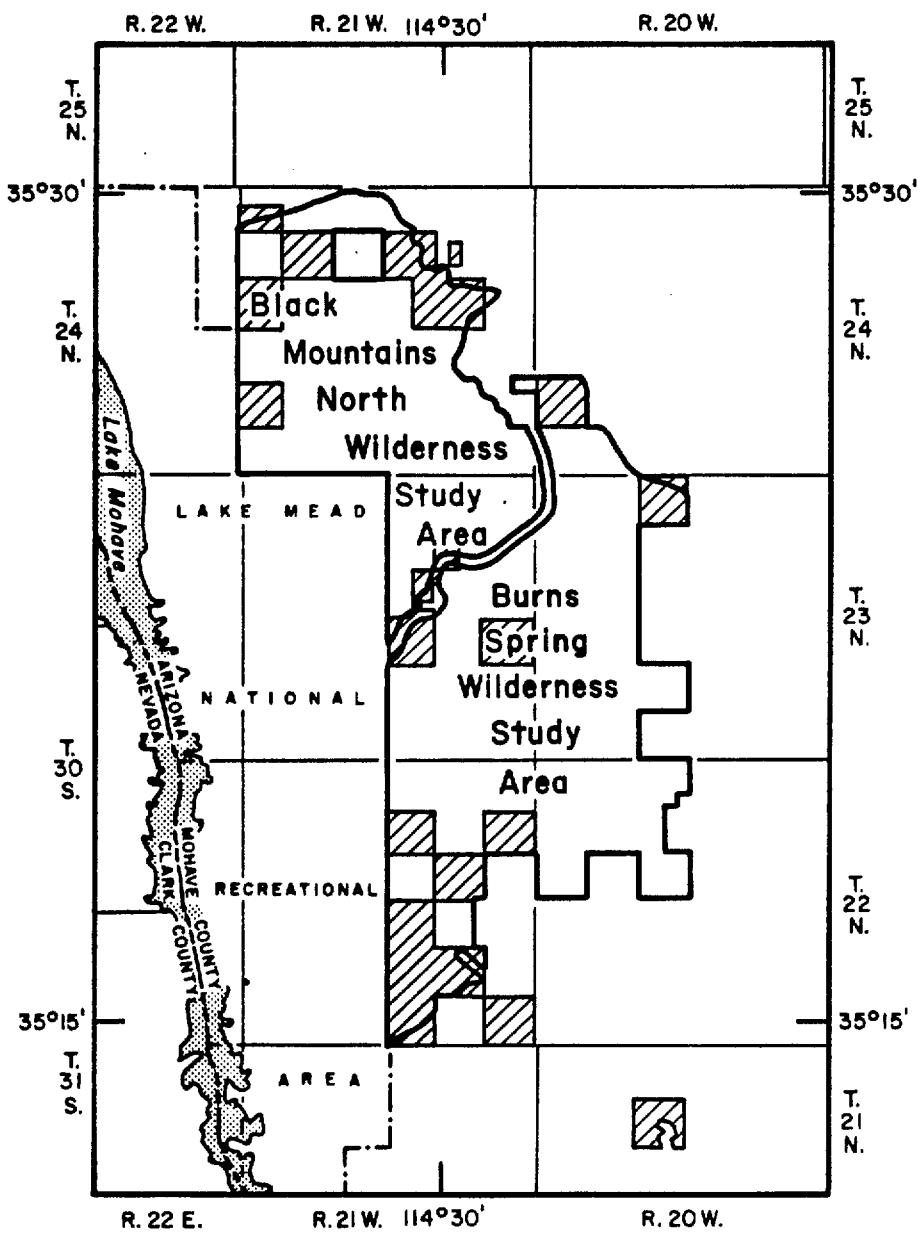
R. 22 E. R. 21 W. 114°30' R. 20 W.

Land status information from the Bureau
of Land Management; current as of 1978.



All surface rights federally owned except as labeled.

Figure 2.--Land status map of the Black Mountains North and Burns Spring Wilderness Study Areas.



R. 22 E. R. 21 W. 114°30' R. 20 W.
Oil and gas lease information from the Bureau
of Land Management; current as of 1986.

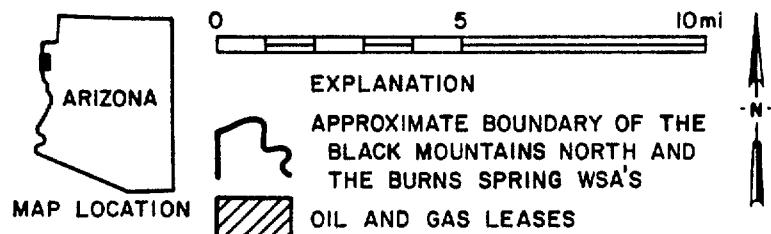


Figure 3.--Oil and gas lease map of the Black Mountains North and Burns Spring Wilderness Study Areas.

Precambrian-, Tertiary-, and Quaternary-age rocks crop out in the WSA's. Precambrian gneiss, schist, and granite are unconformably overlain by Tertiary volcanics, which range in composition from rhyolite to basalt and exhibit varying amounts of alteration, fracturing, and brecciation. Quaternary colluvium and alluvium are common as terrace and valley fill deposits. (See Great Basin GEM Joint Venture, 1983.)

Structurally, the study areas are in a region of crustal extension which, theoretically, has led to formation of low-angle detachment faults. The detachment fault is usually at the contact of the Tertiary volcanics and the Precambrian rocks. North-trending low- to high-angle normal faults merge with the detachment faults at depth. (See Anderson, 1971.)

Both the normal faults and the detachment faults are hosts for gold mineralization in mining districts in the Black Mountains.

• MINING HISTORY

The Black Mountains host many gold mining districts. The closest districts to the WSA's, from north to south, are the Virginia, the Pilgrim, and the Union Pass (Katherine). The currently operating Portland Mine and associated prospects lie about 7 mi from all of these districts.

The Virginia district is north of and overlaps the Black Mountains North WSA (pl. 1). The district was intermittently active from 1907-1955 when reported production was 76,000 tons of ore, containing 17,800 oz gold, 17,700 oz silver, 1,000 lb copper, and 3,000 lb lead (Keith and others, 1983, p. 52-53). Production from within the WSA is not recorded and is probably low.

The Pilgrim district lies about 3 mi east of the Burns Spring WSA. Between 1929-1945, the district produced 281,000 tons of ore, containing 48,000 oz of gold, and 72,000 oz of silver (Keith and others, 1983, p. 42-43). This district does not extend into either WSA.

The Union Pass (Katherine) district is south of and overlaps the southern portion of the Burns Spring WSA (pl. 1). The district was intermittently active from 1865-1943 and had reported production of 704,000 tons of ore, containing 128,000 oz of gold, and 313,000 oz of silver (Keith and others, 1983, p. 52-53). Production from within the WSA, if any, was low.

The Portland Mine, which is between the study areas (fig. 1), was probably discovered in the early 1930's. Underground and surface gold production began in late 1935 or early 1936, and the ore was shipped about 15 mi south-southwest to the Katherine Mill (Gardner, 1936, p. 48). Production figures were not found.

RECENT ACTIVITY

The Portland Mine was reopened as an open pit (fig. 4) by Western States Mineral Corp. in March 1985. Mining ceased temporarily in mid-1987. Leaching activity is being conducted at the site, and is expected to continue through 1988. Approximately 1,000,000 tons of ore have been removed in the most recent mining. Pre-mining ore-grade estimates were 0.06-0.07 oz/st of gold (Charles Williams, geologist, Western States Minerals Corp., oral commun., 1988). Drilling in the immediate vicinity of the open pit has not revealed additional reserves; however, a parallel structure or downfaulted portion of the Portland vein was discovered west of the pit. This structure will probably be explored by additional drilling (Allen Gordon, mining engineer, Western States Mineral Corp., oral commun., 1988).

Just northeast of the Portland Mine, along the Lost Cabin Wash road, altered volcanics cover parts of both WSA's. In May 1987, Combined Minerals Reduction Co. drilled seven shallow (less than 100 ft deep) holes in the altered volcanics with surface geochemical anomalies of gold. Gold anomalies

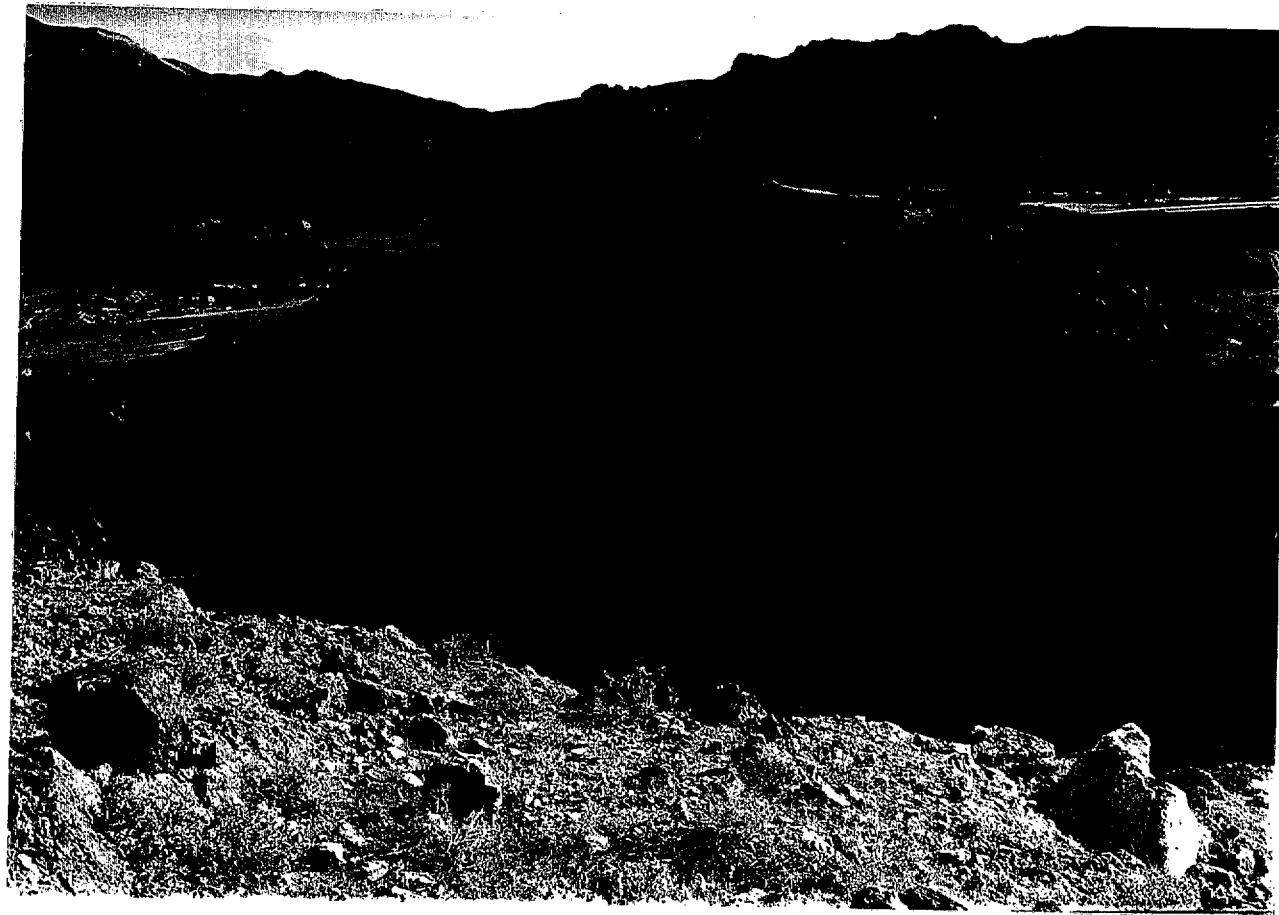


Figure 4.--Photograph of the Portland Mine showing part of the highwall. Wilderness study areas are in the background.

continued to the depth tested and the company plans additional, deeper drilling if the WSA's are designated open for mining (Fred Humphrey, geologist, Combined Metals Reduction Co., oral commun., 1988).

Geologic mapping, drilling, and sampling in the southern part of the Burns Spring WSA was done by Gold Fields Mining Corp., Anaconda Minerals Co., and Fischer-Watt Gold Co., Inc. between 1983-1986. Indicated subeconomic resources of 3,280,000 tons containing 0.0152 oz/st of gold are at Gold Chain Hill, adjacent to, but outside the WSA (fig. 5). Drill holes inside the WSA intersected gold-bearing rock; however, no resources were defined (Fischer-Watt Gold Co., Inc., Kingman, AZ, files).

Zeolites along Cottonwood Road, inside and adjacent to the Black Mountains North WSA, were examined by Occidental Minerals in 1979. The area was subsequently staked, but the claims were allowed to lapse sometime during the transfer of zeolite properties between Occidental, Phelps Dodge, Tenneco, and Steelhead Resources (BLM files, Kingman, Arizona).

In the Virginia district, about 1 1/2 mi north of the Black Mountains North WSA, Combined Metals Reduction Co. is developing a mining plan to extract up to 20,000 oz of gold in an open-pit heap-leaching operation at the Klondyke Mine (pl. 1). Mining is expected to begin in late 1989 (Fred Humphrey, geologist, Combined Metals Reduction Co., oral commun., 1988).

The Black Dyke area (fig. 5), about 1/2 mi southeast of the Burns Spring WSA, was drilled by Western States Mineral Corp. in 1988. Results were promising, and additional work is in progress (Allen Gordon, mining engineer, Western States Mineral Corp., oral commun., 1988).

Independent miners were working the Roadside Mine in the Spring of 1987 (pl. 1). The Roadside Mine, about 1 mi southeast of the Burns Spring WSA, was a part of an exploration program by Anaconda and Fischer-Watt in 1983-1986.

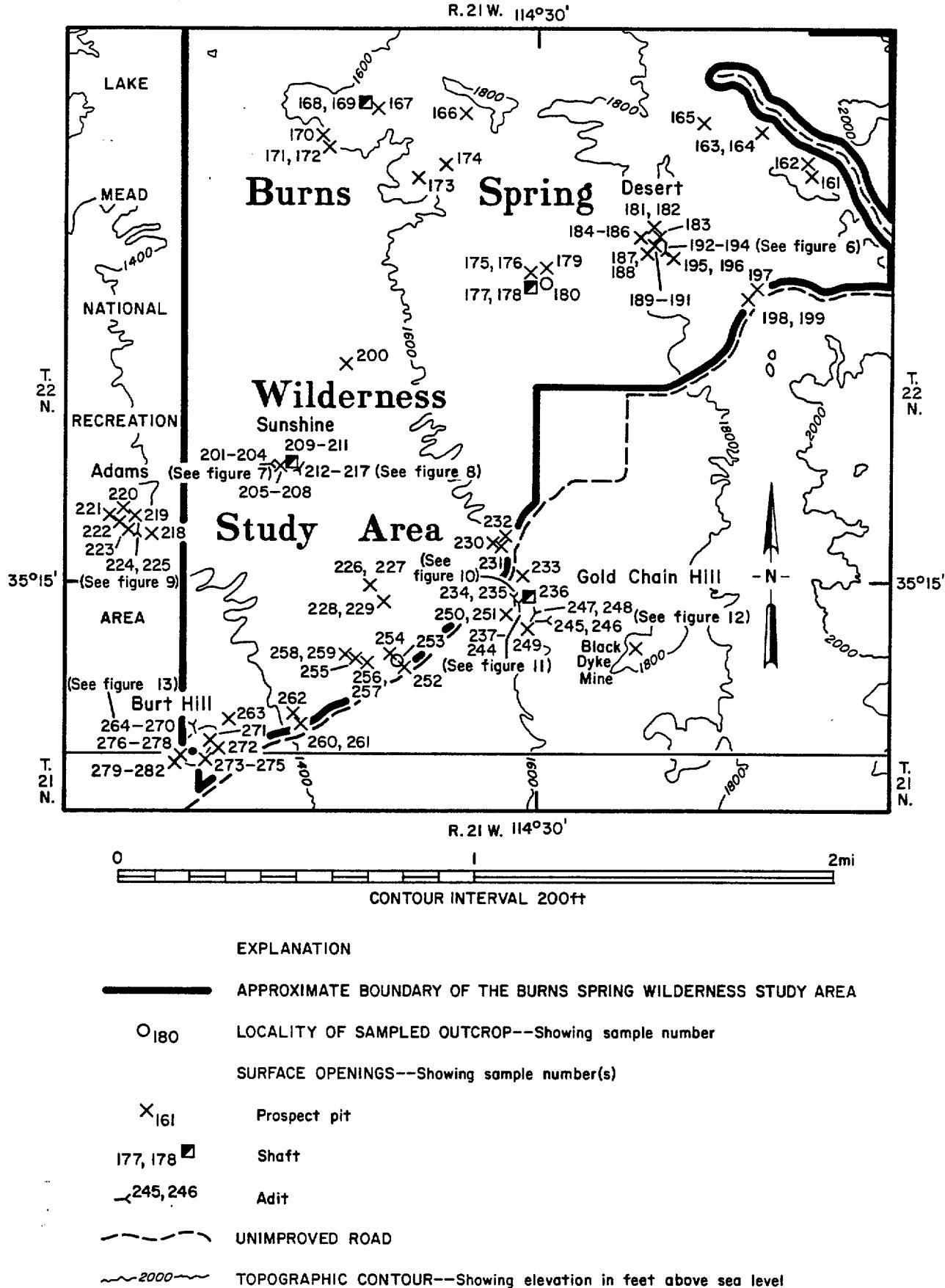


Figure 5.--Southern end of the Burns Spring Wilderness Study Area, showing sample localities 161-282.

RESULTS OF INVESTIGATION

Gold is presently being produced at the Portland Mine and exploration for additional gold deposits continues in both WSA's. Zeolite-bearing rocks and perlite are present in the WSA's.

Gold

Portland Mine area

The Portland Mine is an open pit (fig. 4) between the WSA's in Portland Wash on the west side of the Black Mountains (pl. 1). The ore is in a 5- to 20-ft-thick brecciated quartz-calcite vein striking approximately north and dipping 20-30° east and in 10- to 150-ft of stockwork in the footwall. Undated quartz diorite and basalt dikes are exposed in the footwall, and the hanging wall is Tertiary andesite and latite. Few, if any, sulfides are in the system and only trace amounts of gold are disseminated into the hanging wall of the vein. Average ore grade was about 0.05-0.08 oz/st of gold and about 1,000,000 tons were removed from 1985-1987 (Charles Williams, Western States Minerals Corp., personal commun., 1988; Pete Drobeck, consultant, personal commun., 1988).

A 2 1/2-ft-wide fault zone, striking N. 80° E. and dipping 45° N., is exposed in a shaft a few hundred feet southeast of the leach pads of the Portland Mine (pl. 1, sample 118). The zone cuts andesite and consists of red-brown gouge and brecciated andesite. A chip sample across the fault zone contained 7,830 ppb (0.23 oz/st) of gold and 41 ppm (1.2 oz/st) of silver (table 1, sample 118). The fault zone is not traceable at the surface.

Prospect pits and outcrops in the vicinity of the Portland Mine were sampled. North of the Portland Mine, three samples of altered volcanics were weakly mineralized and contained a maximum of 19 ppb (0.0006 oz/st) of gold

(table 1, samples 107-109). Samples from prospect pits around the Portland were barren of gold (table 1, samples 110-113, 120); most of the pits west of the mine appeared to be location pits dug for claim assessment purposes.

South of the Portland Mine, Precambrian granitic rocks are exposed locally (pl. 1). In most places the contact with Tertiary rocks was soil-covered. In places, the overlying Tertiary rock was conglomerate, and in other places, it was volcanic breccia. Outcrop samples from the Precambrian and Tertiary rocks near the contact contained a maximum of 7 ppb (0.0002 oz/st) gold (table 1, sample 142). Stream-sediment samples 133 and 138 (table 3) and panned concentrate sample 137 (table 2) from this vicinity contained small amounts of gold. No surface resources are identified at the Precambrian-Tertiary contacts south of the Portland Mine; however, the existence of detectable gold in some samples indicates weak mineralization, possibly associated with the contact.

Altered rhyolite area

Fractured, altered rhyolite crops out about 1 1/2 mi northeast of the Portland Mine, within both WSA's (pl. 1). The rhyolite is vesicular in places and is yellow to brown on fresh surfaces. Limonite and hematite are concentrated on fracture surfaces and disseminated in the rock to some extent. The altered rhyolite is cut by mafic dikes and quartz and calcite veins and veinlets.

Structurally, the ground in the altered area has been prepared for mineralization. Two northwest-trending faults cut the altered area and the rhyolite has been severely fractured. A northeast-trending fault may also be present (Jack Hamm, Combined Metals Reduction Co., personal commun., 1988).

In the north part of the altered area, rhyolite is in contact with Precambrian granite. The depositional (fault?) contact was not exposed.

The maximum gold concentration in altered rock samples from prospect pits and outcrops in the area was 360 ppb (0.01 oz/st) (table 1, sample 79). With the exception of samples 78 and 97, all of the rock samples taken from the altered area north of Lost Cabin Wash contained gold in low concentrations (table 1, samples 67, 76-81, 97).

Panned-concentrate and stream-sediment samples were taken from washes draining the altered area (table 2, samples 68, 82, 93, 95, 98, 100; table 3, samples 69, 83, 94, 96, 99, 101). With the exception of sample 68, every panned concentrate contained gold. Maximum concentration was 9,950 ppb (0.29 oz/st) gold (table 2, sample 95). Sample 99 was the only stream sediment from the altered area to contain gold (6 ppb, 0.0002 oz/st).

Combined Metals Reduction Company drilled seven holes in the altered rhyolite, each less than 100 ft deep, in May 1987. Anomalous gold concentrations were intersected; however, the grades were not economic for mining. Additional exploration is in progress in this area (Fred Humphrey, Jack Hamm, Combined Metals Reduction Company, personal commun., 1988).

Southern end of Burns Spring Wilderness Study Area

The south end of the Burns Spring WSA is in the Union Pass (Katherine) mining district and contains several prospects and small underground workings (figs. 5-13). Most of this area is covered by alluvium, with Precambrian and Tertiary rock exposed on low ridges and knobs. Virtually every exposure of the pre-Quaternary rocks has been prospected (fig. 5).

Geologically, the area is complex. Precambrian porphyritic granite is intruded by Tertiary rhyolite dikes trending generally northwest. Some

rhyolite flows are present as well. Much of the rock is brecciated and altered to the extent that the nature of the original rock is obscured. Faults generally trending north to northwest with steep dips cut all the rocks. Silicification has occurred in some of the dikes and breccias.

Gold and minor amounts of silver and molybdenum are widely distributed in this area. With the exception of a sample from the Sunshine prospect containing oxidized copper (fig. 5, table 1, sample 205), no base-metal-bearing minerals were identified. Of 122 surface and underground samples taken in and near the southern end of the Burns Spring WSA, 80 contained detectable gold, ranging from 5-6,650 ppb (0.0002-0.19 oz/st). Eight samples contained greater than 1,000 ppb (0.029 oz/st) (table 1, samples 191, 194, 195, 210, 212, 245, 247, 248). Molybdenum concentrations in this area are generally higher than in the remainder of the WSA's. This is especially true at the longest adit on Gold Chain Hill, where four samples have greater than 100 ppm molybdenum (table 1, fig. 5, samples 240-243). Molybdenum concentrations have been noted at epithermal gold deposits elsewhere. The significance of the molybdenum is not yet clear (Silberman and Beyer, 1988, p. 225).

The highest gold concentrations at the surface were at three localities: the Desert prospect, the Sunshine prospect, and Gold Chain Hill (fig. 5). These areas and other locations in the south end of the WSA have been drilled in the 1980's. Drill results indicate widespread but low gold concentrations throughout the southern end of the Burns Spring WSA. Adjacent to the WSA at Gold Chain Hill, drilling has defined indicated subeconomic resources of 3,280,000 tons of 0.0152 oz/st of gold from the surface to about a 200 ft depth. The mineralization in the south end has been related to a low-angle

detachment fault which is exposed southeast of the WSA and underlies the southern end, probably at a shallow depth (Fischer-Watt Gold Co., Inc., files, 1987). If this is the case, mineralized rock underlies shallow unconsolidated Quaternary deposits in the south end of the WSA. Most drilling has been done on or adjacent to knobs exposed through alluvium. Drilling away from the knobs could reveal economic concentrations of gold beneath a thin, unconsolidated overburden.

Indicated subeconomic gold resources exist at the surface to a depth of 200 ft at Gold Chain Hill. Additional subeconomic or economic gold resources are probably present beneath the thin Quaternary overburden in the southern part of the Burns Spring WSA.

Black Mountains North Wilderness Study Area

The northern end of the Black Mountains North WSA is within the southern portion of the Virginia mining district. Two small workings are within the WSA (pl. 1, sample sites 5-6, 23-28).

Within and adjacent to the WSA, Tertiary volcanics are cut by generally northwest-trending low- and high-angle faults and veins. Calcite and lesser amounts of quartz comprise the veins.

None of the veins from outside the WSA could be traced into the study area; however, a low-angle gouge zone and a high-angle calcite vein are exposed in the WSA. The low-angle gouge zone is in a small prospect and is 1 in. thick. The hanging and footwall of the zone contain low gold concentrations of 16 ppb (0.0005 oz/st), and 39 ppb (0.001 oz/st), respectively (table 1, samples 5, 6).

The calcite vein is exposed in a 15-ft shaft. The vein strikes northwest and contains gold concentrations ranging from 9 ppb (0.0003 oz/st) to 1,950

ppb (0.057 oz/st) (table 1, samples 21-23, 26, 27). In addition, the hanging wall of the vein has numerous calcite veinlets and stringers and carries 15 ppb (0.0004 oz/st) to 32 ppb (0.0009 oz/st) of gold (table 1, samples 25, 28). The footwall of the vein is fractured, relatively calcite-free, and contains no detectable gold (table 1, sample 24).

Southeast of the calcite vein, in and adjacent to the Black Mountains North WSA in the Squaw Pocket well vicinity, prospect pits have been excavated in Tertiary volcanics, Precambrian rock, and at the contacts of Tertiary intrusives in Precambrian rock (pl. 1, sample sites 29-40). Low gold concentrations ranging from 6-10 ppb (0.0002-0.0003 oz/st) were present in 3 of 12 samples (table 1, samples 30, 36, 37).

Near Lost Cabin Spring, quartz veins and pods in Precambrian granite are exposed in prospect pits (pl. 1, sample sites 51-60). Gold concentrations of 7-8 ppb (0.0002 oz/st) were present in 4 of 10 samples.

No prospect pits were located on the extremely rugged western slope of the Black Mountains North WSA from south of the calcite vein discussed previously to the Portland Mine. Tertiary volcanics are the primary rocks exposed. Stream-sediment and panned-concentrate samples were taken to determine if mineralization from the Virginia district or the Portland Mine extends into the WSA (pl. 1, sample sites 17-20, 41-48, 63-66, 103-106). With the exception of sample 19, every panned concentrate from drainages on the west slope from Cottonwood Road to 2 mi north of the Portland Mine contained gold. Gold concentrations ranged from 36 to 842 ppb (0.001-0.025 oz/st) in the samples with detectable gold (table 2, samples 18, 42, 44, 46, 48, 63, 66). Two stream-sediment samples from this area carried gold (sample 20, 28 ppb, 0.0008 oz/st; sample 47, 67 ppb, 0.002 oz/st). The source of the gold is

unknown; but is certainly within the WSA. The gold may be disseminated in the volcanics or localized along structures.

Zeolites

Zeolite-bearing ash beds of Tertiary age are common in both WSA's (pl. 1). Some of these beds, usually the most accessible, were mapped and sampled on a reconnaissance level. The zeolites identified by x-ray diffraction were clinoptilolite and mordenite.

Clinoptilolite and mordenite have widely varied uses. The major uses are municipal sewage treatment and the treatment of radioactive wastewater. Other uses for clinoptilolite include: fillers in paper, detergent additives, plywood manufacturing, carriers of agricultural chemicals, animal feed supplements, and soil conditioner. Mordenite is sometimes used in lightweight brick construction. (See Torii, 1978, p. 441.)

Most past and present zeolite-producing deposits are fairly pure, containing about 60 to 99% zeolites. Experimental methods to beneficiate ore from 60 to 70% zeolites to 80 to 85% zeolites have been successful. (See Mondale and others, 1978, p. 527.)

Another major quality important to zeolites, especially for wastewater treatment, is the ammonium ion-exchange capacity. Mercer and Ames (1978, p. 451) recommend a minimum ammonium ion-exchange capacity of 1.7 meq/g.

Zeolites sampled in and near the WSA's were in beds from 7- to 100-ft thick. Purity was from 10 to 50% clinoptilolite, 20 to 55% mordenite, and 60 to 80% total zeolite content. The ammonium ion-exchange capacity ranged from 0.32 to 0.64 meq/g (table 4). The samples were usually of the purest-looking material and purposely excluded quartz and fluorite veins and veinlets which cut some of the zeolite beds, therefore the actual zeolite content of the deposits is somewhat lower than 60 to 80%.

Although the zeolite beds sampled in this study are low grade and have a low ammonium ion-exchange capacity, beneficiation of the ore could improve the ammonium ion-exchange capacity. The zeolite beds identified on plate 1 can be classed as inferred subeconomic resources. Additional zeolite beds occur in remote portions of the WSA's not traversed for this study. An estimated 180,000,000 of inferred subeconomic resources of zeolite are present in the study areas.

Perlite

Perlite, a volcanic glass, is found in both study areas and is often in proximity to zeolites (pl. 1). When crushed to uniform size and rapidly heated to its softening point, it expands into a lightweight, fluffy material used for numerous industrial applications including lightweight aggregate for plaster and concrete, filter aid, insulation, and paint extenders.

Surface samples of perlite taken from 7- to 50-ft-thick beds were expanded, or popped, at three different pre-heat temperatures. Post-popping densities ranged from 71 kg/m^3 to 128 kg/m^3 . Perlite of this quality is acceptable for use as aggregate in plaster and concrete, although most currently exploited ore is higher quality (The Perlite Corporation, written commun., 1987). About 20,000,000 tons of inferred subeconomic resources of perlite are in both WSA's. Detailed mapping and sampling of the beds would be required to quantify the resources. Additional perlite beds probably exist at the surface in portions of the WSA's not traversed.

CONCLUSIONS

The Black Mountains North and Burns Spring WSA's are in an area of active gold mining and exploration. The currently operating Portland Mine is between the WSA's, and its north-trending vein may extend into either or both areas.

Gold-bearing vein material, drilled west of the pit, is either a faulted segment of the Portland vein or a parallel structure. Altered rhyolite in both study areas northeast of the Portland Mine has low surface and subsurface gold concentrations. Additional exploration is in progress. The south end of the Burns Spring WSA is mineralized with gold at the surface and subsurface. Indicated subeconomic resources of 3,280,000 tons of 0.0152 oz/st gold ore have been identified by drilling at Gold Chain Hill, adjacent to the WSA. Within the study area, shallow drilling also has encountered widespread, subeconomic gold concentrations. Additional drilling could reveal blocks of ore-grade material similar in size to the Gold Chain Hill deposit. The northern part of the Black Mountains North WSA has a gold-bearing calcite vein which may be a target for future exploration. Nearly all sediment samples from drainages on the western slope of the Black Mountains North WSA carry gold. The source of the gold could be extensions of structures at the Portland Mine or Virginia district, or similar structures; or the gold may be disseminated in the Tertiary volcanics. Further exploration could determine if the gold source is economic.

About 180,000,000 tons of inferred subeconomic resources of zeolites and 20,000,000 tons of perlite exist in both study areas. The most accessible beds are low to medium quality. Higher quality zeolites and perlite may be present in the WSAs in unsampled locations.

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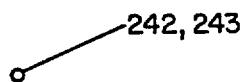
REFERENCES--Continued

Wilson, E. D., 1959, Geologic map of Mohave County, Arizona: Arizona Bureau of Mines, scale 1:375,000.

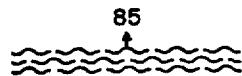
EXPLANATION OF SYMBOLS FOR FIGURES 6-13



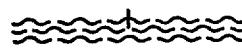
HORIZONTAL CHIP SAMPLE LOCALITY--Showing sample number



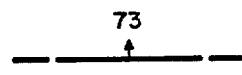
SAMPLE LOCALITY--Showing sample number(s)



FAULT OR SHEAR ZONE--Showing strike and dip



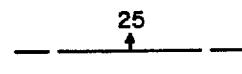
VERTICAL FAULT OR SHEAR ZONE



FAULT--Showing strike and dip; dashed where approximate



VERTICAL FAULT



CONTACT--Showing strike and dip; dashed where approximate



OPENCUT



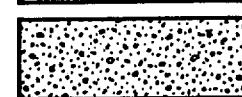
BRECCIA



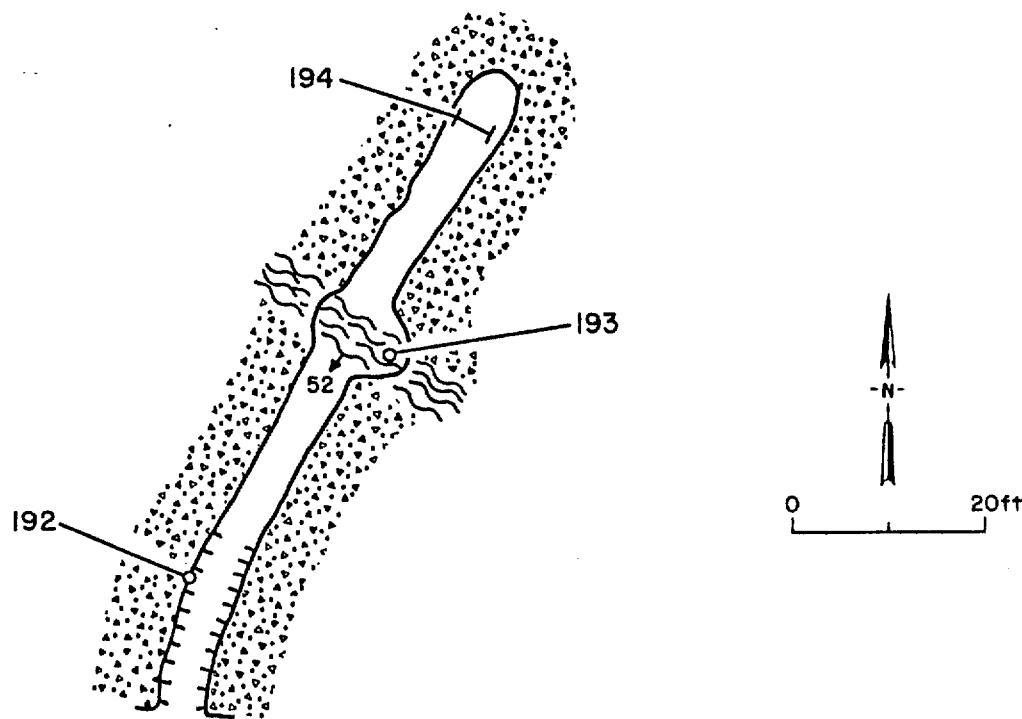
ALTERED BRECCIA



RHYOLITE

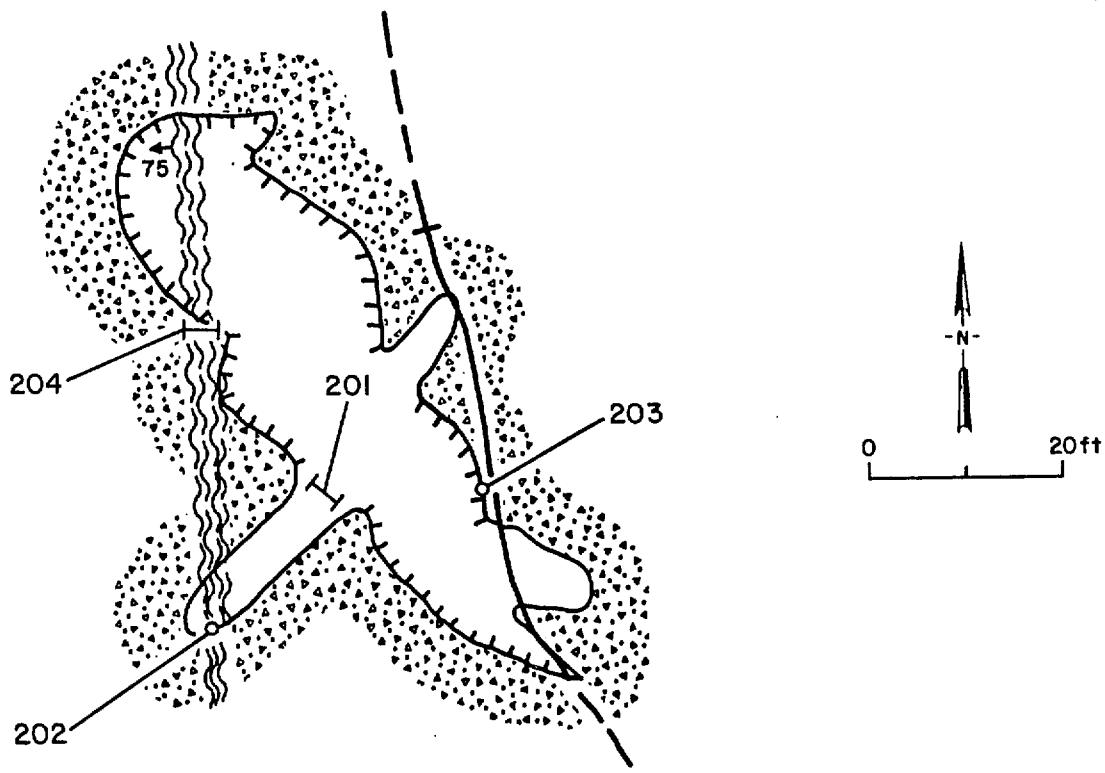


COLLUVIAL



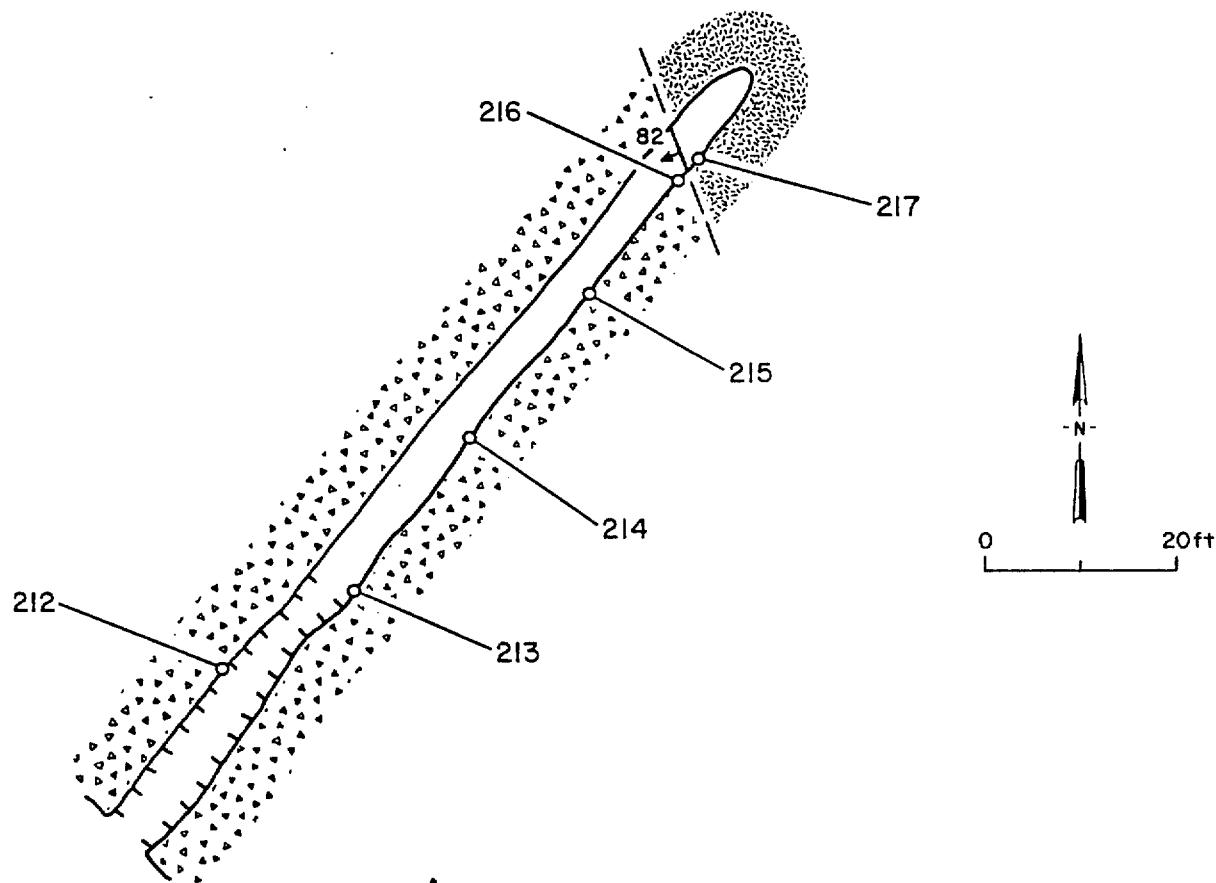
No.	Chip Sample Length (ft)	Analytical data		Remarks
		Au ppb	Ag ppm	
192	4.0	90	<5	Brecciated granite; abundant quartz veinlets, iron oxide.
193	4.0	15	<5	Gouge to 3 in. wide.
194	3.0	1,460	<5	Altered breccia; quartz stringers; abundant iron oxide.

Figure 6.--Adit at the Desert prospect.



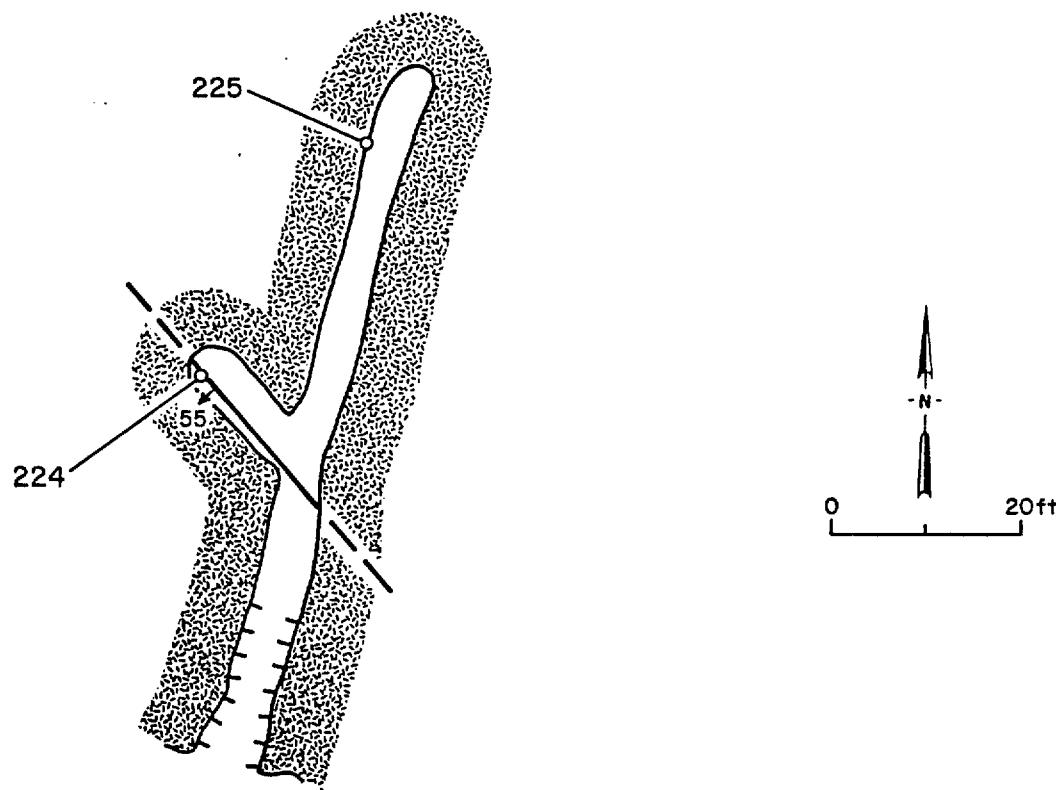
Chip Sample No.	Length (ft)	Analytical data		Remarks
		Au ppb	Ag ppm	
201	2.5	230	<5	Red breccia.
202	3.0	20	10	Do.
203	1.5	817	<5	Gray gouge; abundant iron oxide.
204	2.0	320	<5	Abundant iron oxide, green quartz, bleached gouge.

Figure 7.--Open cut and short adits at the Sunshine prospect.



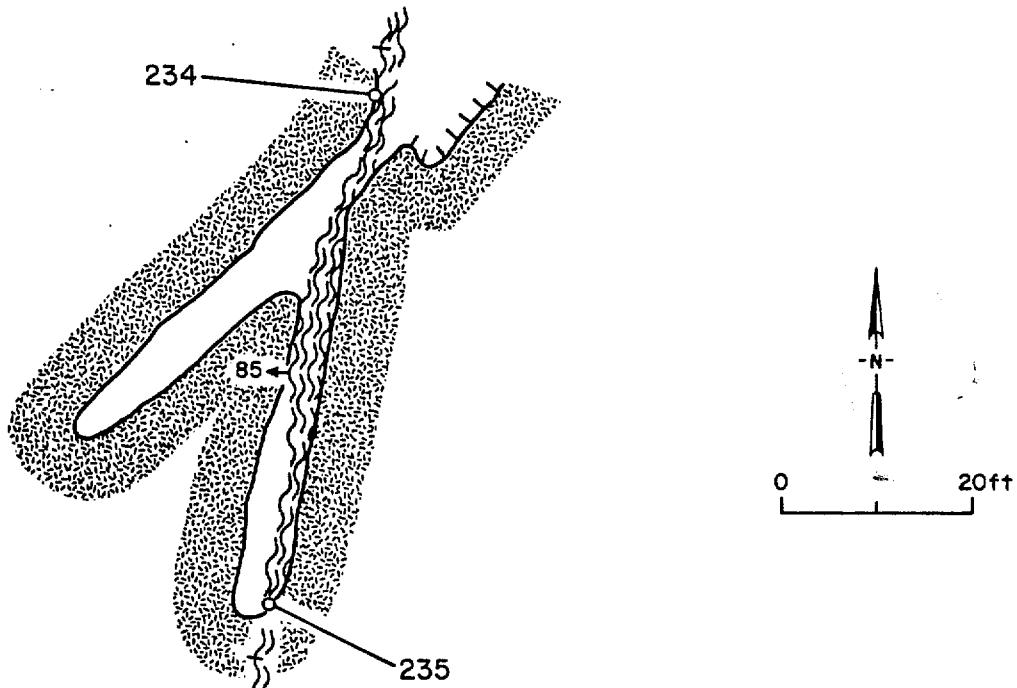
No.	Chip Sample Length (ft)	Analytical data		Remarks
		Au ppb	Ag ppm	
212	4.5	2,350	11	Brecciated granite; limonite, quartz.
213	3.0	<5	<5	Do.
214	2.3	200	<5	Do.
215	2.3	210	<5	Do.
216	1.3	44	<5	Do.
217	2.5	16	<5	Gray rhyolite.

Figure 8.--Long adit at the Sunshine prospect.



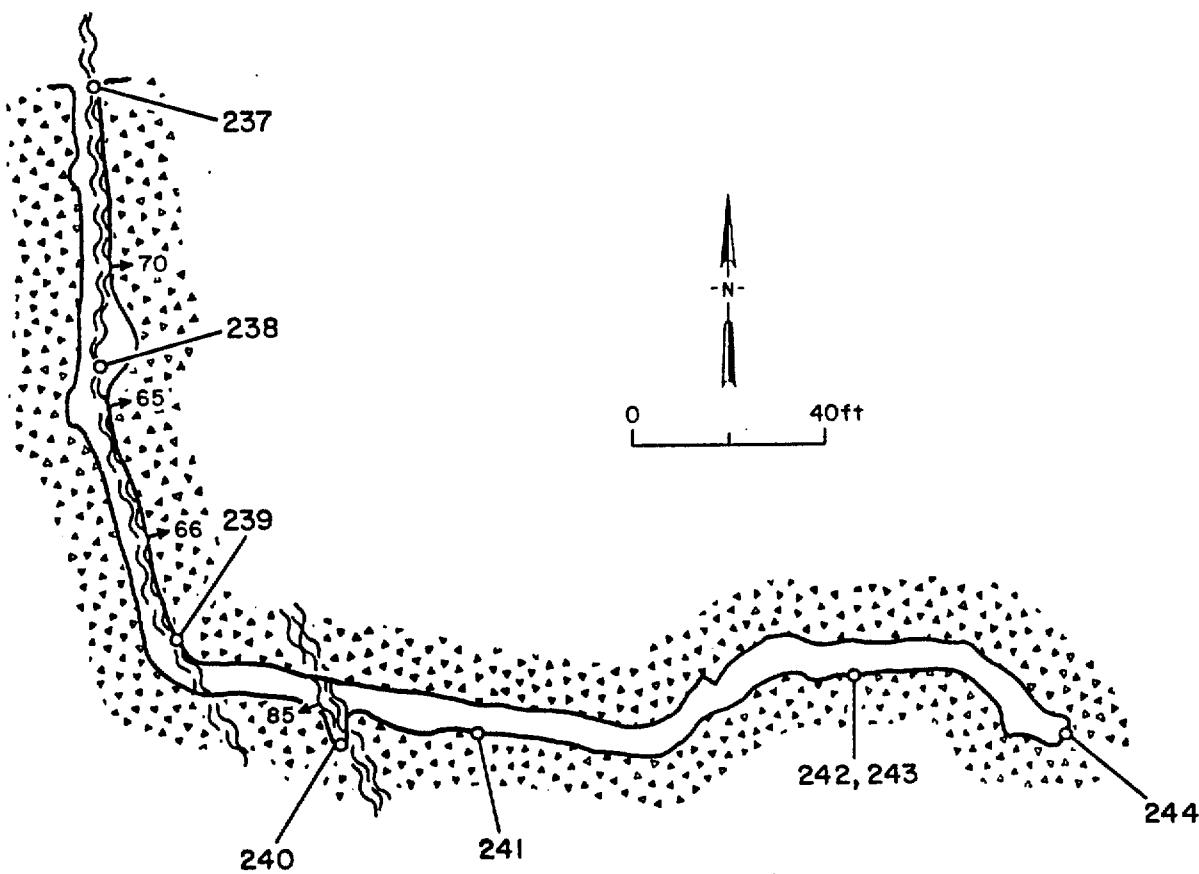
Chip Sample No.	Length (ft)	Analytical data		Remarks
		Au ppb	Ag ppm	
224	1.0	430	8	Breccia, calcite, quartz, gouge.
225	1.0	63	<5	Brecciated rhyolite; iron oxide veinlets.

Figure 9.--Adit at the Adams prospect.



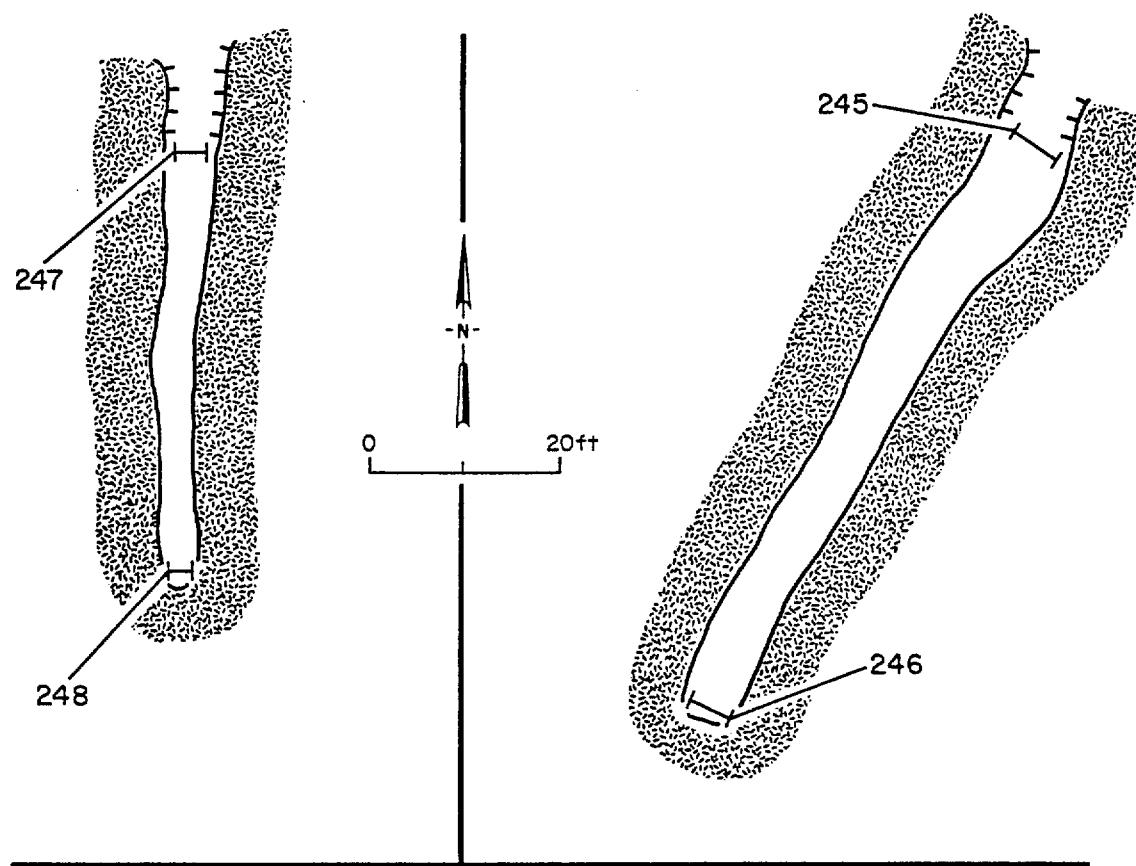
No.	Chip Sample Length (ft)	Analytical data		Remarks
		Au ppb	Ag ppm	
234	2.0	410	<5	Altered, weathered rhyolite.
235	1.0	29	<5	Do.

Figure 10.--Lowest adit on Gold Chain Hill.



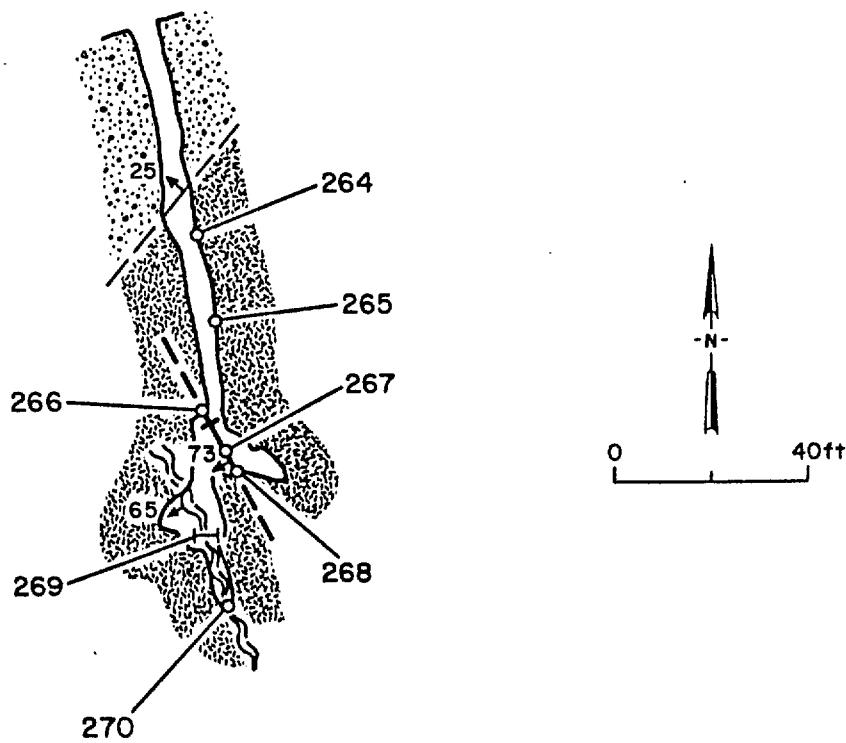
Chip Sample No.	Length (ft)	Analytical data		Remarks
		Au ppb	Ag ppm	
237	3.0	868	37	Breccia, quartz, calcite, iron oxide.
238	2.0	25	<5	Do.
239	5.0	190	<5	Breccia; sparse quartz, iron oxide.
240	2.0	110	5	Breccia, gray rhyolite.
241	4.0	42	<5	Hematite, quartz in upper 1/3 of sample; lower 2/3 is lighter with clay, minor calcite, limonite.
242	3.0	220	<5	Gray breccia.
243	3.0	65	<5	Breccia; abundant iron oxide, quartz.
244	4.0	410	<5	Breccia; abundant iron oxide.

Figure 11.--Longest adit on Gold Chain Hill.



No.	Chip Sample Length (ft)	Analytical data		Remarks
		Au ppb	Ag ppm	
245	4.0	3,710	23	Breccia, quartz, calcite, iron oxide.
246	3.0	20	<5	Do.
247	2.5	1,620	<5	Red and gray breccia; quartz veinlets.
248	2.5	1,270	7	Gray rhyolite; quartz veinlets, kaolinite.

Figure 12.--Adits east of the longest adit on Gold Chain Hill.



Chip Sample No.	Length (ft)	Analytical data		Remarks
		Au ppb	Ag ppm	
264	4.0	<5	<5	Bleached powdery rhyolite.
265	4.0	<5	<5	Minor hematite.
266	1.5	<5	<5	Quartz vein in fault zone; common hematite.
267	1.5	<5	<5	Same as 266; less quartz, hematite.
268	1.5	<5	<5	Bleached powdery rhyolite.
269	6.5	<5	<5	Do.
270	2.5	<5	<5	Do.

Figure 13.--Adit on Burt Hill.

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas, Mohave County, Arizona.

[Symbols used: <, less than; xx, not applicable.]

No.	Sample Type	Length ft	Description	Analytical data								
				Au ppb	Ag	Sb	As ppm	Ba ppm	Be	Br	Cd	Ce
1	chip	1.2	Zone strikes N. 55° W., dips 45° NE, calcite veins and veinlets in volcanics.	4,930	<5	2.1	9	1,100	3.0	<5	<10	78
2	do.	.3	Fault strikes N. 75° W., dips 20° NE; limonite-stained gouge, chlorite in rhyolite porphyry.	140	8	2.0	9	1,200	10.0	<5	<10	160
3	do.	1.0	Quartz-calcite vein strikes N. 10° E, dips 35° SE.; volcanic host rocks.	1,810	<5	1.5	9	750	3.0	<5	<10	71
4	do.	1.0	Southern extension of sample 3; structure is brecciated.	420	<5	1.9	8	650	2.0	<5	<10	91
5	do.	2.0	Footwall of 1-in.-wide low-angle gouge zone; chlorite, iron oxides in volcanics.	39	13	1.3	66	1,200	3.0	<5	<10	270
6	do.	2.5	Hanging wall of low-angle gouge zone; more limonite, calcite veinlets than 5.	16	<5	1.6	118	2,300	3.0	<5	<10	160
7	do.	2.0	Abundant chlorite, moderate limonite in dark gray volcanics.	<5	<5	1.1	4	1,700	5.0	<5	<10	260
8	do.	2.0	Calcite-cemented breccia above 7, abundant epidote; contact between 7 and 8, strikes N. 35° W., dips 35° NE.	8	9	1.3	8	1,600	3.0	<5	<10	200
9	do.	4.0	Quartz lens in rhyolite porphyry.	<5	<5	1.0	<1	590	1.0	<5	<10	<10
11	select	xx	Quartz, fluorite veinlets and pods in zeolite outcrops; moderate iron oxides.	<5	<5	3.4	15	220	2.0	<5	<10	64
21	chip	5.0	Limonite-stained pod of calcite and volcanics.	1,950	<5	1.3	6	1,900	2.0	<5	<10	230
22	do.	.7	Calcite vein strikes N. 70° W., dips 70° NE.	260	<5	.8	6	1,100	2.0	<5	<10	110
23	do.	1.0	do.	70	7	.7	4	830	2.0	<5	<10	88
24	do.	1.0	Footwall of vein of 23; fractured, olive-green volcanics.	<5	<5	.9	4	1,700	3.0	<5	<10	230

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Cs	Cr	Co	Eu	Fe	Hf	Ir	La	Lu	Mo	Na	Ni	Rb
	ppm	ppm	ppm		%	ppm	ppb	ppm	ppm		%	ppm	ppm
1	<1	150	14	<2	2.0	5	<100	52	<0.5	<2	2.40	<50	95
2	109	54	<10	<2	1.9	<2	<100	92	<.5	<2	1.30	<50	460
3	<1	120	19	<2	2.7	3	<100	43	<.5	<2	1.30	84	53
4	<1	57	12	<2	1.6	2	<100	46	<.5	<2	1.60	<50	41
5	<1	81	30	<2	6.6	10	<100	120	.6	<2	3.70	<50	84
6	5	<50	24	4	6.7	9	<100	86	<.5	<2	2.30	<50	170
7	10	230	34	5	5.6	7	<100	110	<.5	<2	1.20	110	84
8	5	190	22	<2	5.0	7	<100	91	<.5	<2	.60	55	140
9	<1	150	<10	<2	<.5	<2	<100	7	<.5	<2	3.10	<50	51
11	8	140	<10	<2	<.5	<2	<100	28	<.5	3	.23	<50	100
21	<1	120	27	<2	2.8	9	<100	100	<.5	<2	1.10	95	65
22	1	81	<10	<2	1.8	4	<100	51	<.5	<2	1.10	<50	75
23	<1	<50	<10	<2	1.9	<2	<100	43	<.5	<2	1.20	<50	58
24	<1	120	23	4	4.7	8	<100	110	<.5	<2	2.60	<50	100

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Sc	Se	Sm	Sn	Ta	Te	Tb ppm	Th	W	U	Yb	Zn	Zr
1	4.8	<10	5.5	<200	<1	<20	<1	11.0	6	1.2	<5	240	<500
2	6.6	<10	7.5	<200	3	<20	<1	31.0	4	4.9	<5	<200	<500
3	8.4	<10	5.6	<200	<1	<20	<1	5.7	<2	1.1	<5	<200	<500
4	5.6	<10	5.9	<200	<1	<20	1	6.0	<2	.9	<5	<200	770
5	15.0	<10	16.0	<200	1	<20	2	16.0	<2	5.8	<5	<200	<500
6	7.4	<10	11.0	<200	2	<20	<1	16.0	<2	7.4	<5	<200	<500
36	23.0	<10	18.0	<200	<1	<20	2	13.0	<2	2.8	<5	<200	<500
	19.0	<10	14.0	<200	<1	<20	2	11.0	3	2.7	<5	200	730
9	.6	<10	<.5	<200	<1	<20	<1	5.8	<2	.6	<5	<200	<500
11	1.4	<10	2.0	<200	1	<20	<1	17.0	<2	2.7	<5	<200	<500
21	8.9	<10	15.0	<200	2	<20	<1	14.0	<2	2.4	<5	<200	<500
22	6.7	<10	7.1	<200	<1	<20	<1	6.1	4	1.4	<5	<200	<500
23	6.1	<10	6.0	<200	<1	<20	<1	5.3	<2	1.0	<5	<200	<500
24	14.0	<10	15.0	<200	<1	<20	2	15.0	<2	2.9	<5	<200	<500

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

No.	Sample Type	Length ft	Description	Analytical data									
				Au ppb	Ag	Sb	As	Ba ppm	Be	Br	Cd	Ce	
25	chip	2.0	Hanging wall of vein of 23; calcite veinlets and more limonite than 24.	32	<5	0.7	3	1,500	3.0	<5	<10	140	
26	select	xx	Stockpile from 15-ft-deep shaft; calcite.	250	<5	.2	<1	420	2.0	<5	<10	40	
27	chip	.5	Calcite vein strikes N. 38° W., dips 56° NE.; same vein as 22-23.	9	<5	.4	<1	490	2.0	<5	<10	45	
28	do.	3.0	Hanging wall of 27; fractured volcanics, calcite veinlets.	15	<5	.9	4	1,200	3.0	<5	<10	150	
29	do.	4.0	Fractured, red and gray mottled volcanics.	<5	<5	1.0	9	1,200	2.0	<5	<10	46	
30	do.	3.0	Brecciated, silicified volcanics?; chlorite, iron oxides abundant.	• 6	<5	.6	12	1,100	3.0	<5	<10	38	
31	do.	2.0	Fractured, red and gray mottled volcanics; quartz and calcite veinlets.	<5	<5	.5	6	880	2.0	<5	<10	24	
32	do.	3.0	Fractured, red and gray mottled volcanics.	<5	<5	.5	6	2,200	2.0	<5	<10	57	
37	33	do.	4.5	Chlorite muscovite granite; near contact with rhyolite dike.	<5	<5	.7	3	790	2.0	<5	<10	110
	34	do.	5.0	Rhyolite dike?	<5	<5	1.5	6	210	2.0	<5	<10	83
35	select	xx	Quartz; probably a pocket in Precambrian rock.	<5	5	12.0	3	320	1.0	<5	<10	<10	
36	do.	xx	Mylonite?; quartz, chlorite.	8	<5	14.0	5	1,300	3.0	<5	<10	80	
37	do.	xx	Granite; abundant hematite, quartz veinlets.	10	<5	25.4	8	1,200	3.0	<5	<10	100	
38	do.	xx	do.	<5	6	18.0	7	930	2.0	<5	<10	93	
39	chip	1.0	Iron-stained gneiss.	<5	<5	.2	3	1,100	2.0	<5	<10	160	
40	do.	2.5	Quartz vein strikes N. 50° E., dips 75° SE.	<5	<5	<.2	<1	720	1.0	<5	<10	27	
51	do.	4.0	Mafic dike strikes N. 40° W., dips 50° SW.	<5	<5	.9	8	520	8.0	<5	<10	62	

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Cs	Cr	Co ppm	Eu	Fe %	Hf ppm	Ir ppb	La	Lu ppm	Mo	Na %	Ni ppm	Rb
25	3	<50	18	3	3.6	5	<100	66	<0.5	<2	2.00	<50	140
26	<1	<50	<10	<2	.7	<2	<100	20	<.5	<2	.27	<50	28
27	<1	<50	<10	<2	1.1	<2	<100	19	<.5	<2	.48	<50	36
28	3	81	21	<2	3.8	7	<100	67	<.5	<2	1.70	<50	100
29	2	54	<10	<2	1.9	7	<100	27	<.5	78	.28	<50	170
30	5	79	18	<2	2.9	5	<100	17	<.5	12	1.20	<50	180
31	<1	66	<10	<2	1.3	16	<100	9	.6	5	3.20	<50	56
32	3	120	<10	<2	1.6	13	<100	25	.8	27	2.20	<50	140
33	3	180	29	<2	5.5	5	<100	54	<.5	<2	2.50	<50	88
34	1	100	<10	<2	1.0	7	<100	40	<.5	<2	2.20	<50	170
35	6	160	<10	<2	.6	<2	<100	5	<.5	<2	.12	<50	120
36	13	88	22	<2	4.2	<2	<100	47	<.5	<2	.44	90	170
37	25	140	18	<2	3.8	<2	<100	44	<.5	<2	.13	68	160
38	9	100	25	<2	4.4	<2	<100	36	<.5	3	.15	63	130
39	8	190	34	<2	7.7	8	<100	80	.9	<2	.83	81	160
40	2	78	<10	<2	.5	<2	<100	9	<.5	<2	2.60	<50	96
51	62	86	23	<2	6.8	<2	<100	24	<.5	<2	1.70	<50	130

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data													
	Sc	Se	Sm	Sn	Ta	Te	Tb ppm	Th	W	U	Yb	Zn	Zr	
25	8.6	<10	8.9	<200	<1	<20	<1	9.4	4	2.0	<5	210	<500	
26	1.9	<10	2.3	<200	<1	<20	<1	1.6	<2	<.5	<5	<200	<500	
27	1.9	<10	2.4	<200	<1	<20	<1	3.0	<2	1.0	<5	<200	<500	
28	8.4	<10	9.4	<200	1	<20	<1	12.0	4	2.0	<5	<200	<500	
29	3.8	<10	2.6	<200	1	<20	<1	12.0	3	3.6	<5	<200	<500	
30	6.7	<10	4.5	<200	1	<20	1	10.0	5	2.9	<5	<200	<500	
31	2.5	<10	2.3	<200	1	<20	<1	7.2	<2	2.5	<5	<200	750	
32	4.1	<10	5.6	<200	<1	<20	<1	11.0	4	3.3	<5	<200	<500	
63	33	13.0	<10	7.7	<200	2	<20	<1	12.0	<2	1.7	<5	<200	<500
	34	2.0	<10	3.2	<200	2	<20	<1	27.0	<2	4.3	<5	<200	<500
	35	<.5	<10	<.5	<200	<1	<20	<1	9.1	<2	.8	<5	<200	<500
	36	12.0	<10	7.8	<200	<1	<20	<1	6.4	16	1.3	<5	<200	<500
	37	10.0	<10	7.6	<200	<1	<20	2	5.0	73	2.0	<5	<200	<500
	38	11.0	<10	6.3	<200	<1	<20	<1	5.2	23	3.8	<5	<200	<500
	39	29.0	<10	11.0	<200	1	<20	2	27.0	<2	3.4	9	<200	<500
	40	1.0	<10	1.2	<200	<1	<20	<1	1.3	<2	.8	<5	<200	<500
	51	24.0	<10	5.3	<200	2	<20	2	6.3	10	2.2	<5	<200	1,000

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample			Description	Analytical Data									
No.	Type	Length ft		Au ppb	Ag	Sb	As ppm	Ba ppm	Be	Br	Cd	Ce	
52	chip	1.5	Quartz vein strikes N. 5° W., dips 80° SW., adjacent to 51.	7	<5	0.3	6	670	4.0	<5	<10	56	
53	select	xx	Vein material adjacent to 52.	7	<5	.2	2	<100	.5	<5	<10	13	
54	chip	3.0	Weathered, coarse-grained granite; abundant iron-oxide.	<5	<5	<.2	4	1,100	3.0	<5	<10	79	
55	do.	8.0	Quartz pod; moderate iron-oxide.	<5	<5	.5	3	230	.5	<5	<10	30	
56	do.	2.0	Weathered granite and 0.7-ft-thick mafic dike.	8	9	1.1	3	860	5.0	<5	<10	61	
57	select	xx	Quartz, minor hematite.	<5	<5	<.2	<1	140	<.5	<5	<10	<10	
58	chip	11.0	Fractured, medium-grained granite.	8	<5	.4	8	680	4.0	<5	<10	99	
59	do.	8.0	do.	<5	<5	.7	7	940	3.0	<5	<10	83	
60	select	xx	Quartz vein material.	<5	<5	.2	3	900	3.0	<5	<10	100	
O†	67	random chip	xx	Fractured red and white rhyolite; abundant iron-oxide on fractures.	7	<5	.6	3	<100	3.0	<5	<10	43
70	chip	1.0	Quartz vein strikes N. 45° W., dips 80° NE.; vitrophyre host rock.	<5	<5	.9	<1	520	2.0	<5	<10	90	
76	do.	2.0	Shear zone strikes N. 45° E., dips 63° SE.; calcite, quartz veinlets.	18	<5	2.0	32	1,000	3.0	<5	<10	100	
77	do.	2.5	Shear zone strikes N. 10° W., dips 18° NE.; quartz, white gouge; merges with zone of 76.	27	<5	2.0	29	1,100	3.0	<5	<10	110	
78	do.	3.0	Rhyolite; minor limonite.	<5	<5	.9	37	970	3.0	<5	<10	120	
79	do.	2.5	Fractured rhyolite; abundant iron oxide.	360	<5	2.9	33	1,100	20.0	<5	<10	96	
80	do.	4.0	do.	75	<5	2.7	50	1,600	8.0	<5	<10	140	
81	do.	3.5	Fractured rhyolite; abundant iron oxide; dominant fractures strike N. 5° W., dip 85° SW.	16	<5	1.8	51	1,600	6.0	<5	<10	150	

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Cs	Cr	Co ppm	Eu	Fe %	Hf ppm	Ir ppb	La	Lu ppm	Mo	Na %	Ni ppm	Rb
52	7	230	<10	<2	1.7	4	<100	31	0.5	7	1.40	<50	120
53	1	220	<10	<2	<.5	<2	<100	6	<.5	4	.08	<50	21
54	4	100	<10	<2	2.0	6	<100	42	.7	3	2.00	<50	180
55	2	210	<10	<2	.9	<2	<100	10	<.5	3	.23	<50	53
56	6	100	16	<2	5.2	5	<100	29	.7	<2	1.90	60	130
57	2	120	<10	<2	<.5	<2	<100	<5	<.5	<2	.21	<50	21
58	5	79	<10	<2	1.8	5	<100	40	.7	<2	2.00	<50	210
59	5	100	<10	<2	1.2	7	<100	39	.7	<2	2.10	<50	210
60	3	110	<10	<2	.5	6	<100	34	.6	4	2.10	<50	180
67	<1	<50	<10	<2	.6	4	<100	25	<.5	<2	1.90	<50	190
70	<1	160	<10	<2	.9	6	<100	57	<.5	<2	.36	<50	140
76	2	<50	<10	<2	1.3	6	<100	36	<.5	2	.42	<50	170
77	3	<50	11	<2	2.1	7	<100	53	<.5	<2	1.60	<50	260
78	3	54	<10	4	1.8	9	<100	63	<.5	<2	2.30	<50	210
79	1	51	98	<2	4.3	7	<100	41	<.5	3	1.50	200	110
80	1	69	33	<2	2.8	7	<100	72	<.5	<2	1.60	150	190
81	2	77	<10	<2	2.4	10	<100	73	<.5	3	2.50	<50	130

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Sc	Se	Sm	Sn	Ta	Te	Tb	Th	W	U	Yb	Zn	Zr
	ppm												
52	10.0	<10	5.8	<200	1	<20	1	13.0	<2	3.3	<5	<200	<500
53	.6	<10	1.2	<200	<1	<20	<1	2.5	<2	.7	<5	<200	<500
54	15.0	<10	8.5	<200	2	<20	2	18.0	<2	4.6	7	<200	<500
55	4.1	<10	2.1	<200	<1	<20	<1	4.8	<2	1.5	<5	<200	<500
56	21.0	<10	6.8	<200	<1	<20	2	11.0	4	3.2	<5	230	890
57	.8	<10	<.5	<200	<1	<20	<1	1.4	<2	<.5	<5	<200	<500
58	14.0	<10	8.3	<200	2	<20	2	19.0	<2	5.7	<5	<200	<500
59	13.0	<10	7.7	<200	2	<20	3	18.0	<2	5.6	7	<200	<500
60	11.0	<10	6.9	<200	<1	<20	1	15.0	<2	5.0	<5	<200	<500
67	2.1	<10	.8	<200	2	<20	<1	38.0	<2	5.1	<5	<200	1,200
70	2.3	<10	4.1	<200	1	<20	<1	14.0	<2	2.5	<5	<200	<500
76	2.9	<10	4.5	<200	1	<20	<1	18.0	5	3.0	<5	<200	<500
77	4.9	<10	6.2	<200	1	<20	1	27.0	3	4.2	<5	<200	<500
78	4.8	<10	6.8	<200	2	<20	1	40.0	<2	7.1	<5	<200	<500
79	3.3	<10	5.7	<200	<1	<20	1	9.0	3	2.1	<5	<200	<500
80	3.8	<10	9.4	<200	<1	<20	2	12.0	5	2.8	<5	<200	<500
81	6.0	<10	9.1	<200	<1	<20	<1	13.0	<2	2.9	<5	<200	<500

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas Arizona--Continued

No.	Sample Type	Length ft	Description	Analytical data								
				Au ppb	Ag	Sb	As ppm	Ba ppm	Be	Br	Cd	Ce
84	random chip	xx	Altered white, yellow volcanics; abundant iron-oxide.	16	<5	1.8	29	1,800	3.0	<5	<10	130
85	chip	9.0	Sheared andesite porphyry mixed with mafic material.	<5	6	.6	31	1,400	5.0	<5	<10	170
86	do.	4.0	Andesite porphyry.	<5	<5	1.2	50	1,000	3.0	<5	<10	150
87	do.	3.0	Altered yellow volcanics; abundant limonite.	<5	<5	.9	54	1,100	4.0	<5	<10	75
88	select	xx	Vuggy quartz veins and veinlets; in mafic dike.	8	10	1.2	17	1,100	3.0	<5	<10	84
89	random chip	xx	Dark gray to brown mafic dike of sample 88.	<5	<5	.9	14	1,100	3.0	<5	<10	91
90	chip	7.0	Light green and Limonite-stained volcanics.	<5	<5	1.2	21	1,110	3.0	<5	<10	110
91	random chip	xx	Altered white, yellow volcanics; abundant iron-oxide.	<5	<5	1.0	20	1,200	3.0	<5	<10	140
92	do.	xx	do.	<5	9	1.0	27	1,300	2.0	<5	<10	97
97	chip	5.0	Altered andesite; quartz pockets, veinlets; abundant limonite.	<5	<5	.5	5	1,000	3.0	<5	<10	140
102	do.	.3	Fractured gray rhyolite porphyry; abundant iron-oxide.	<5	<5	1.0	6	1,000	5.0	<5	<10	140
107	do.	3.0	Rhyolite; iron-stained siliceous nodules.	7	<5	.6	<1	1,500	3.0	<5	<10	120
108	random chip	xx	Brecciated, fractured rhyolite; abundant iron-oxide, minor quartz, calcite in veinlets.	11	<5	.4	7	1,800	3.0	<5	<10	130
109	chip	6.0	Altered fractured rhyolite; abundant iron-oxide.	19	<5	.5	4	1,700	3.0	<5	<10	140
110	do.	3.0	Fault zone strikes north, dips 60° E.; clay gouge in iron-stained volcanics.	<5	<5	3.6	72	1,500	3.0	<5	<10	190

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Cs	Cr	Co ppm	Eu	Fe %	Hf ppm	Ir ppb	La	Lu ppm	Mo	Na %	Ni ppm	Rb
84	2	<50	<10	<2	1.2	9	<100	64	<0.5	<2	2.30	<50	150
85	4	<50	<10	<2	3.0	15	<100	91	.5	<2	2.50	<50	160
86	<1	<50	12	<2	3.8	9	<100	82	.5	<2	3.00	<50	130
87	<1	140	15	<2	3.9	8	<100	48	<.5	<2	4.00	<50	47
88	<1	110	28	<2	4.7	6	<100	50	<.5	<2	2.10	<50	59
89	1	130	33	<2	4.6	7	<100	52	<.5	<2	2.70	90	50
90	<1	130	23	<2	4.2	6	<100	47	<.5	<2	3.00	96	77
91	1	<50	<10	<2	1.4	9	<100	68	<.5	<2	1.70	<50	150
92	<1	<50	<10	<2	1.3	9	<100	56	<.5	<2	1.80	<50	140
97	<1	<50	20	<2	4.8	8	<100	63	<.5	<2	2.00	<50	77
102	5	<50	15	<2	3.3	9	<100	82	<.5	<2	2.50	<50	170
107	2	<50	12	<2	2.5	5	<100	74	<.5	<2	1.90	<50	100
108	<1	56	<10	4	1.8	10	<100	76	<.5	<2	3.10	<50	99
109	3	<50	<10	<2	1.6	9	<100	73	<.5	<2	3.10	<50	130
110	4	260	26	3	4.9	7	<100	88	<.5	<2	1.60	180	130

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Sc	Se	Sm	Sn	Ta	Te	Tb ppm	Th	W	U	Yb	Zn	Zr
84	5.6	<10	8.9	<200	2	<20	1	15.0	6	2.7	<5	<200	<500
85	6.7	<10	11.0	<200	2	<20	1	25.0	<2	3.5	<5	300	<500
86	12.0	<10	9.4	<200	3	<20	2	20.0	<2	4.0	<5	<200	1,000
87	17.0	<10	6.9	<200	2	<20	<1	10.0	5	3.0	<5	<200	<500
88	14.0	<10	6.4	<200	<1	<20	<1	9.2	<2	1.6	<5	<200	<500
89	15.0	<10	6.8	<200	1	<20	<1	10.0	3	2.1	<5	<200	<500
90	14.0	<10	6.5	<200	2	<20	<1	10.0	3	2.0	<5	<200	<500
91	3.5	<10	7.1	<200	2	<20	2	21.0	8	4.6	<5	<200	700
92	3.9	<10	5.6	<200	2	<20	2	21.0	4	4.6	<5	<200	<500
97	13.0	<10	8.3	<200	2	<20	1	12.0	<2	2.6	<5	<200	<500
102	8.0	<10	10.0	<200	2	<20	2	30.0	<2	5.4	<5	<200	1,000
107	7.4	11	8.3	<200	<1	<20	2	15.0	<2	3.1	<5	<200	<500
108	5.0	<10	8.7	<200	2	<20	1	13.0	<2	3.2	<5	<200	<500
109	5.9	<10	9.3	<200	2	<20	1	14.0	<2	3.1	<5	<200	1,500
110	14.0	<10	12.0	<200	<1	<20	<1	13.0	<2	2.8	<5	<200	<500

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

No.	Sample Type	Length ft	Description	Analytical Data									
				Au ppb	Ag	Sb	As ppm	Ba	Be	Br	Cd	Ce	
111	random chip	xx	Brecciated rhyolite cemented with dark calcite.	<5	<5	9.1	51	1,700	3.0	<5	<10	140	
112	chip	3.0	Brecciated, iron-stained rhyolite; slickenslides strike N. 42° W., dip 62° NE.	<5	<5	24.8	99	1,500	3.0	<5	<10	120	
113	do.	3.0	Gray and pink rhyolite.	<5	<5	1.2	12	1,800	3.0	<5	<10	150	
118	do.	2.5	Fault zone strikes N. 80° E., dips 45° NW.; iron-stained gouge.	7,830	41	13.0	33	910	5.0	<5	<10	83	
119	do.	12.0	Altered rhyolite; abundant iron oxide.	<5	<5	6.6	77	1,600	3.0	<5	<10	130	
120	do.	3.0	Green and red rhyolite; adjacent to fault plane, strikes N. 15° W., dips 72° SW.	<5	<5	.3	6	1,200	4.0	<5	<10	150	
121	do.	7.0	Altered rhyolite; abundant iron oxide.	<5	<5	1.2	6	910	3.0	<5	<10	170	
46	129	random chip	xx	Maroon to gray latite; near contact with Precambrian rocks.	<5	<5	.5	4	1,200	3.0	<5	<10	140
	130	do.	xx	Tan weathering, altered vitrophyre?	6	<5	.3	3	1,400	3.0	<5	<10	130
	131	do.	xx	Gray latite?; calcite veinlets; near contact with Precambrian rocks.	<5	<5	.9	6	1,200	3.0	<5	<10	180
	132	chip	7.0	Calcite-quartz-cemented breccia; at contact of Precambrian rocks and Tertiary volcanics.	<5	<5	1.1	18	1,600	3.0	<5	<10	99
	142	do.	5.0	Chloritic granite; near contact with volcanics.	7	<5	2.6	22	1,000	2.0	<5	<10	220
	143	do.	2.0	Rhyolitic conglomerate; near contact with Precambrian rocks.	<5	<5	.4	7	1,200	3.0	<5	<10	110
	144	do.	.5	Jasperoid-filled fault zone strikes N. 70° E., dips 30° NW.; in volcanics.	<5	<5	.9	13	1,200	2.0	6	<10	100
	159	random chip	xx	Altered rhyolite porphyry; abundant iron oxide.	<5	<5	<.2	7	1,800	3.0	<5	<10	240
	161	chip	3.0	Fractured white rhyolite.	46	<5	2.9	9	130	2.0	<5	<10	64

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical Data												
	Cs	Cr	Co ppm	Eu	Fe %	Hf ppm	Ir ppb	La	Lu ppm	Mo	Na %	Ni ppm	Rb
111	2	76	<10	3	2.1	8	<100	71	<0.5	<2	2.60	<50	240
112	5	<50	<10	<2	1.1	10	<100	61	<.5	<2	2.10	<50	190
113	<1	52	<10	<2	2.3	10	<100	72	.5	<2	3.30	<50	110
118	69	100	12	<2	2.3	<2	<100	48	<.5	<2	.81	<50	220
119	4	130	12	<2	1.6	12	<100	67	<.5	<2	2.20	<50	170
120	2	<50	15	<2	4.0	13	<100	71	<.5	<2	1.30	<50	130
121	4	74	15	<2	2.3	11	<100	76	<.5	<2	1.80	56	210
129	1	54	16	<2	3.0	6	<100	71	<.5	<2	2.50	<50	100
130	1	<50	<10	<2	1.6	7	<100	64	<.5	<2	1.00	<50	62
131	<1	<50	<10	<2	3.5	12	<100	92	.5	<2	2.40	<50	150
132	<1	100	18	<2	3.1	5	<100	51	<.5	<2	2.80	<50	61
142	5	130	<10	<2	3.9	12	<100	100	<.5	<2	1.50	<50	160
143	3	<50	<10	<2	3.1	8	<100	67	<.5	<2	2.20	<50	32
144	11	<50	<10	<2	3.6	8	<100	50	<.5	<2	1.70	<50	52
159	<1	<50	<10	2	4.1	10	<100	120	<.5	<2	.88	<50	58
161	<1	94	<10	<2	.8	4	<100	26	<.5	5	.14	<50	170

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Sc	Se	Sm	Sn	Ta	Te	Tb ppm	Th	W	U	Yb	Zn	Zr
111	5.0	<10	8.7	<200	2	<20	<1	14.0	5	3.3	<5	<200	820
112	4.4	<10	8.8	<200	2	<20	1	13.0	<2	2.9	<5	<200	<500
113	5.4	<10	8.8	<200	2	<20	1	13.0	4	2.8	<5	<200	<500
118	7.3	<10	6.1	<200	<1	<43	<1	10.0	4	1.9	<5	<200	<500
119	4.8	<10	7.8	<200	1	<20	1	13.0	<2	9.1	<5	<200	<500
120	8.2	<10	8.3	<200	2	<20	1	25.0	<2	3.9	<5	<200	<500
48	7.6	<10	9.3	<200	2	<20	1	32.0	3	5.9	<5	<200	<500
	9.5	<10	7.9	<200	1	<20	<1	15.0	4	2.9	<5	<200	<500
	4.2	<10	5.8	<200	1	<20	<1	17.0	<2	2.3	<5	<200	<500
	8.0	<10	10.0	<200	2	<20	2	25.0	<2	3.8	<5	<200	<500
	6.0	<10	6.0	<200	1	<20	<1	9.4	3	1.8	<5	<200	<500
	13.0	<10	14.0	<200	1	<20	2	28.0	<2	1.1	<5	<200	950
	8.8	<10	8.2	<200	2	<20	<1	12.0	<2	1.2	<5	<200	<500
	10.0	<10	7.4	<200	<1	<20	1	9.1	<2	2.1	<5	<200	<500
159	11.0	<10	15.0	<200	2	<20	1	15.0	<2	3.5	<5	<200	1,000
161	1.4	<10	4.0	<200	1	<20	<1	14.0	<2	2.3	<5	<200	<500

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

No.	Type	Length ft	Description	Analytical data									
				Au ppb	Ag	Sb	As ppm	Ba	Be	Br	Cd	Ce	
162	chip	2.0	Gray rhyolite porphyry.	12	<5	2.2	9	480	3.0	6	<10	96	
163	do.	1.5	Fractured white rhyolite.	10	<5	2.9	6	310	3.0	<5	<10	77	
164	do.	2.0	Weathered, altered dike? strikes N. 55° W., vertical dip; abundant iron oxide, chlorite and epidote common.	11	<5	1.7	11	580	3.0	<5	<10	130	
165	do.	3.5	Altered, brecciated granite? Abundant iron oxide, epidote and chlorite common.	16	<5	17.0	114	1,300	3.0	<5	<10	210	
166	do.	2.0	Gray rhyolite.	<5	<5	.5	10	1,100	3.0	<5	<10	140	
167	do.	3.5	Siliceous zone strikes N. 55° W., vertical dip; gray rhyolite porphyry, abundant quartz veins, veinlets.	37	5	2.3	2	2,200	5.0	<5	<10	200	
168	grab	xx	Brecciated, quartz-calcite rock from dump of 25-ft-deep shaft.	10	<5	2.9	7	950	14.0	<5	<10	120	
67	169	random chip	xx	Silicified rhyolite?	39	<5	4.3	2	930	29.0	<5	<10	56
	170	chip	2.5	Weathered or altered granite; gouge lenses.	<5	<5	.3	5	810	3.0	<5	<10	180
	171	grab	xx	Fractured gray rhyolite intrusive strikes N. 15° W., vertical dip?	7	<5	1.8	6	220	4.0	<5	<10	71
	172	do.	xx	Porphyritic granite adjacent to sample 171.	<5	<5	.5	5	700	3.0	<5	<10	160
	173	chip	2.0	Weathered, fine-grained granite; abundant iron oxide in fractures.	10	<5	.6	23	970	17.0	<5	<10	79
	174	do.	3.5	do.	<5	<5	.7	3	670	3.0	<5	<10	270
	175	do.	2.5	Weathered or altered fine-grained granite?; abundant epidote, chlorite.	<5	<5	1.1	5	1,500	3.0	<5	<10	220
176	grab	xx	Quartz pod; minor epidote, chlorite.	5	<5	.5	<1	620	3.0	<5	<10	34	
177	chip	3.5	Brecciated red and light green fine-grained granite?; abundant iron oxide.	<5	<5	4.5	7	450	3.0	<5	<10	170	

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Cs	Cr	Co ppm	Eu	Fe %	Hf ppm	Ir ppb	La	Lu ppm	Mo	Na %	Ni ppm	Rb
162	2	62	<10	<2	0.5	6	<100	45	<0.5	<2	0.54	<50	210
163	1	99	<10	<2	.8	8	<100	32	.5	<2	1.50	<50	190
164	7	75	11	<2	3.2	7	<100	60	<.5	<2	1.40	<50	130
165	11	140	12	<2	4.7	10	<100	89	<.5	16	1.90	<50	220
166	3	73	22	<2	4.5	7	<100	69	<.5	<2	3.00	<50	87
167	1	54	11	2	2.7	7	<100	98	<.5	<2	2.20	<50	180
168	2	110	<10	<2	2.1	5	<100	55	<.5	3	.52	<50	180
169	<1	130	<10	<2	<.5	3	<100	25	<.5	8	.22	<50	190
170	1	100	<10	<2	5.3	10	<100	81	.9	<2	2.50	<50	140
171	1	93	<10	<2	.9	8	<100	27	.6	<2	.49	<50	240
172	2	96	15	<2	5.7	14	<100	74	.9	<2	2.70	<50	120
173	6	94	19	3	6.0	8	<100	44	.9	<2	.18	<50	190
174	2	100	<10	<2	2.2	14	<100	110	.9	<2	3.80	<50	140
175	2	110	13	<2	4.5	12	<100	95	<.5	<2	2.20	<50	120
176	1	170	<10	<2	.6	<2	<100	12	<.5	<2	1.50	<50	110
177	8	90	12	<2	3.4	9	<100	76	<.5	2	.09	<50	220

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Sc	Se	Sm	Sn	Ta	Te	Tb ppm	Th	W	U	Yb	Zn	Zr
162	1.8	<10	8.3	<200	1	<20	<1	17.0	<2	3.6	<5	<200	<500
163	1.9	<10	5.5	<200	3	<20	1	24.0	<2	3.5	<5	<200	<500
164	6.9	<10	12.0	<200	1	<20	2	23.0	3	2.0	<5	<200	<500
165	14.0	<10	13.0	<200	2	<20	2	26.0	9	2.3	5	770	<500
166	13.0	<10	10.0	<200	1	<20	1	7.9	<2	1.6	<5	<200	520
167	6.9	<10	11.0	<200	<1	<20	1	15.0	<2	2.6	<5	<200	690
168	4.4	<10	6.4	<200	<1	<20	<1	9.4	3	1.7	<5	<200	<500
169	1.2	<10	3.4	<200	2	<20	<1	14.0	2	1.8	<5	<200	<500
170	15.0	<10	13.0	<200	<1	<20	2	21.0	<2	1.8	6	<200	<500
171	1.7	<10	4.5	<200	3	<20	1	24.0	<2	3.5	<5	<200	<500
172	17.0	<10	12.0	<200	2	<20	2	20.0	6	1.3	<5	<200	<500
173	26.0	<10	6.0	<200	3	<20	2	10.0	<2	3.1	8	<200	<500
174	10.0	<10	17.0	<200	<1	<20	2	64.5	<2	2.5	5	<200	930
175	18.0	<10	15.0	<200	<1	<20	2	13.0	<2	1.2	<5	<200	940
176	1.0	<10	2.8	<200	1	<20	<1	18.0	<2	3.2	<5	<200	<500
177	10.0	<10	11.0	<200	<1	<20	1	21.0	7	2.1	<5	<200	<500

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample No.	Type	Length ft	Description	Analytical data									
				Au ppb	Ag	Sb	As ppm	Ba ppm	Be	Br	Cd	Ce	
178	grab	xx	Quartz pod adjacent to 177.	<5	<5	16.0	5	140	0.5	<5	<10	17	
179	chip	2.0	Brecciated red and light green fine-grained granite? Abundant iron oxide.	8	<5	1.1	7	1,300	4.0	<5	<10	240	
180	grab	xx	Gray rhyolite porphyry dike? trends N. 40° W.	<5	<5	2.8	3	1,500	3.0	<5	<10	110	
181	chip	2.0	Altered rock; abundant kaolinite, iron-oxide, moderate chlorite, green quartz common.	320	<5	2.2	10	430	2.0	<5	<10	150	
182	do.	1.5	Mafic dike?; abundant iron oxide.	<5	<5	6.3	96	2,100	4.0	<5	<10	200	
183	do.	4.0	Altered fine-grained rock; quartz veinlets, abundant iron oxide in fractures; from 10-ft adit bearing S. 45° E.	460	<5	2.7	7	220	2.0	<5	<10	190	
52	184	do.	1.0	Fault zone strikes N. 75° E., dips 55° NW.; iron oxide, gouge, calcite veinlets; from 20-ft-long adit bearing S. 30° W.	170	<5	8.5	144	580	4.0	<5	<10	190
	185	do.	2.5	Altered rock; quartz veinlets, abundant iron oxide in fractures.	140	<5	7.2	70	460	3.0	<5	<10	190
	186	do.	3.5	Light green to gray breccia; abundant quartz.	77	<5	3.9	105	880	3.0	<5	<10	200
	187	random chip	xx	Altered rock, breccia.	270	<5	4.4	90	970	2.0	<5	<10	200
	188	chip	5.0	Altered breccia; abundant iron oxide in fractures; horizontal fault zone with up to 4 in. of gouge; from 14-ft-deep shaft.	56	<5	5.0	83	350	2.0	<5	<10	120
	189	random chip	xx	Gray rhyolite porphyry; near breccia contact.	13	<5	3.7	17	2,300	4.0	<5	<10	180
	190	chip	3.0	Fractured, altered, brecciated rock; abundant iron oxide.	160	<5	2.1	16	840	3.0	<5	<10	170

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Cs	Cr	Co ppm	Eu	Analytical data									
					Fe %	Hf ppm	Ir ppb	La	Lu ppm	Mo	Na %	Ni ppm	Rb	
178	<1	190	<10	<2	0.8	<2	<100	13	<0.5	4	<0.05	<50	42	
179	2	83	15	<2	4.5	11	<100	100	.6	<2	1.80	<50	140	
180	1	96	<10	<2	1.4	5	<100	55	<.5	3	1.30	<50	180	
181	3	170	<10	2	2.2	8	<100	80	<.5	<2	.11	<50	150	
182	4	90	14	2	5.8	13	<100	91	.6	<2	.41	<50	280	
183	3	140	<10	<2	2.5	7	<100	100	<.5	<2	.10	<50	160	
C3	184	13	110	17	<2	2.6	9	<100	110	<.5	5	.23	<50	300
	185	9	160	<10	2	3.9	9	<100	100	<.5	9	.12	<50	230
	186	4	89	15	<2	3.4	10	<100	100	<.5	<2	.17	<50	270
	187	6	110	<10	2	2.7	10	<100	100	<.5	<2	.22	<50	260
	188	3	120	<10	<2	1.5	4	<100	59	<.5	86	.08	<50	170
	189	4	65	18	3	4.2	11	<100	95	<.5	<2	3.40	<50	220
	190	2	110	<10	<2	3.4	11	<100	85	<.5	3	.13	<50	260

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data													
	Sc	Se	Sm	Sn	Ta	Te	Tb ppm	Th	W	U	Yb	Zn	Zr	
178	1.6	<10	1.6	<200	<1	<20	<1	3.1	<2	<0.5	<5	<200	<500	
179	17.0	<10	16.0	<200	1	<20	2	15.0	<2	1.4	7	<200	<500	
180	2.6	<10	5.9	<200	1	<20	<1	18.0	2	2.9	<5	<200	<500	
181	3.4	<10	6.9	<200	<1	<20	<1	19.0	9	.8	<5	<200	<500	
182	19.0	<10	17.0	<200	2	<20	<3	7.8	<2	1.0	6	<200	790	
183	2.7	<10	7.8	<200	<1	<20	<1	18.0	8	.8	<5	<200	600	
54	184	4.5	<10	9.3	<200	1	<20	<1	18.0	8	1.8	<5	<200	<500
	185	5.9	<10	11.0	<200	<1	<20	1	19.0	16	1.3	<5	<200	<500
	186	4.7	<10	8.8	<200	<1	<20	<1	20.0	8	1.8	<5	<200	<500
	187	5.6	<10	9.2	<200	<1	<20	<1	22.0	11	1.2	<5	<200	1,100
	188	2.4	<10	5.2	<200	<1	<20	<1	11.0	<2	.7	<5	<200	<500
	189	12.0	<10	13.0	<200	1	<20	1	13.0	<2	1.0	<5	220	680
	190	3.9	<10	7.5	<200	<1	<20	<1	15.0	7	1.4	<5	<200	<500

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample No.	Type	Length ft	Description	Analytical data								
				Au ppb	Ag	Sb	As ppm	Ba ppm	Be	Br	Cd	Ce
191	grab	xx	Brecciated granite; abundant iron oxide, quartz.	1,710	<5	10.0	232	650	3.0	<5	<10	140
192	chip	4.0	Altered brecciated granite; abundant quartz veinlets, iron oxide.	90	<5	2.8	14	620	3.0	<5	<10	160
193	do.	4.0	Fault zone strikes N. 40° W., dips 52° SW.; gouge veins to 3 in. wide.	15	<5	1.1	6	790	3.0	<5	<10	71
194	do.	3.0	Altered brecciated rock; quartz stringers; abundant iron oxide.	1,460	<5	2.2	9	480	2.0	<5	<10	110
195	do.	2.0	Altered brecciated rhyolite; from trench above adit of 192-194.	3,160	<5	2.4	11	460	2.0	<5	<10	190
196	do.	3.0	Altered brecciated rock; siliceous; abundant quartz, iron oxide.	140	<5	2.1	10	370	2.0	<5	<10	150
197	do.	3.0	Altered fractured rock, partly silicified; abundant iron oxide; 10-ft-long adit bearing N. 50° W. along contact of this material and gray rhyolite.	12	<5	5.1	57	1,600	2.0	<5	<10	200
198	do.	1.0	Fault zone strikes N. 65° W., dips 80° NE.; gray gouge and rock fragments; continuation of structure in adit of 197.	<5	6	9.3	90	1,200	5.0	<5	19	150
199	do.	2.0	Altered silicified rock.	150	<5	14.0	216	650	3.0	<5	11	130
200	do.	4.0	Fractured brecciated granite?; moderate iron oxide, chlorite.	10	<5	.8	8	1,200	3.0	<5	<10	190
201	do.	2.5	Red breccia.	230	<5	1.5	8	630	3.0	<5	<10	230
202	do.	3.0	do.	20	10	4.9	13	1,200	5.0	<5	<10	280
203	do.	1.5	Fault zone strikes N. 10° W., vertical dip; gray gouge; abundant iron oxide.	817	<5	2.2	10	310	3.0	<5	<10	130
204	do.	2.0	Shear zone strikes N. 5° W., dips 75° SW.; altered breccia; abundant iron oxide, green quartz, bleached gouge.	320	<5	1.8	8	690	3.0	<5	<10	160
205	select	xx	Silicified rhyolite; malachite, azurite.	150	<5	1.3	8	1,800	2.0	<5	17	460

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Cs	Cr	Co ppm	Eu	Fe %	Hf ppm	Ir ppb	La	Lu ppm	Mo	Na %	Ni ppm	Rb
191	9	140	<10	<2	3.4	8	<100	70	<0.5	15	0.13	<50	250
192	3	170	11	<2	4.9	9	<100	77	<.5	18	.17	<50	200
193	4	120	62	<2	6.5	5	<100	33	<.5	<2	.62	150	260
194	2	200	<10	<2	2.6	7	<100	51	<.5	48	.09	<50	170
195	2	96	<10	2	4.1	11	<100	86	<.5	12	.11	<50	240
196	2	190	<10	<2	3.2	7	<100	70	<.5	22	.10	<50	180
197	3	99	<10	3	4.5	10	<100	100	<.5	24	.25	<50	280
198	4	<50	17	<2	3.0	7	<100	64	<.5	15	2.40	<50	190
199	6	120	12	<2	3.6	7	<100	64	.5	40	.14	<50	230
200	4	65	14	<2	5.3	12	<100	87	<.5	<2	1.80	<50	200
201	3	110	16	3	5.2	12	<100	100	<.5	4	.16	<50	320
202	6	81	10	3	6.8	18	<100	130	.8	<2	.17	<50	260
203	7	77	11	<2	3.9	7	<100	69	<.5	<2	.13	<50	290
204	2	110	<10	<2	3.6	10	<100	76	<.5	6	.19	<50	240
205	<1	<50	28	3	1.7	6	<100	89	.6	<2	1.00	<50	330

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Sc	Se	Sm	Sn	Ta	Te	Tb ppm	Th	W	U	Yb	Zn	Zr
191	4.0	<10	4.7	<200	<1	<20	<1	14.0	5	1.3	<5	<200	730
192	13.0	<10	14.0	<200	1	<20	2	14.0	18	1.2	<5	<200	<500
193	20.0	<10	6.9	<200	<1	<20	1	3.5	<2	.9	<5	230	<500
194	10.0	<10	8.3	<200	<1	<20	<1	6.7	3	.7	<5	<200	<500
195	18.0	<10	13.0	<200	1	<20	.1	10.0	16	<.5	<5	<200	<500
196	8.8	<10	8.5	<200	<1	<20	1	10.0	7	1.0	<5	<200	<500
197	10.0	<10	13.0	<200	<1	<20	2	17.0	7	2.1	<5	<200	<500
198	7.6	<10	9.0	<200	<1	<20	<1	10.0	7	2.6	<5	800	<500
199	8.6	<10	9.3	<200	<1	<20	1	7.8	7	1.1	<5	470	<500
200	17.0	<10	13.0	<200	1	<20	1	23.0	<2	2.5	<5	<200	890
201	16.0	<10	14.0	<200	1	<20	1	13.0	<2	1.5	<5	<200	790
202	30.0	<10	22.0	<200	2	<20	3	15.0	12	1.5	<5	<200	<500
203	8.3	<10	8.0	<200	<1	<20	1	9.2	4	1.3	<5	<200	720
204	13.0	<10	11.0	<200	<1	<20	1	10.0	8	1.1	<5	<200	<500
205	4.3	<10	19.0	<200	1	<20	2	23.0	<2	6.4	<5	6,500	<500

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

No.	Sample Type	Length ft	Description	Analytical data								
				Au ppb	Ag	Sb	As	Ba ppm	Be	Br	Cd	Ce
206	chip	4.0	Red and white rhyolite; abundant iron oxide; adjacent to 205.	26	6	0.7	5	1,700	2.0	<5	<10	130
207	do.	3.0	Gray rhyolite; adjacent to 206.	<5	10	3.0	8	1,900	3.0	<5	20	210
208	do.	2.5	Silicified rhyolite.	20	<5	1.4	3	530	1.0	<5	<10	96
209	select	xx	Brecciated granite; abundant vuggy and sugary quartz, iron oxide.	120	8	1.3	5	800	3.0	<5	<10	130
210	chip	5.0	do.	6,650	<5	1.3	4	170	1.0	<5	<10	79
211	grab	xx	Brecciated granite, limonite, vuggy quartz; from dump of 28-ft shaft.	500	<5	1.0	11	720	3.0	<5	<10	140
212	chip	4.5	Brecciated granite, limonite, quartz.	2,350	11	1.3	6	440	2.0	<5	<10	76
213	do.	3.0	do.	<5	<5	<.2	<1	170	.5	<5	<10	<10
214	do.	2.3	do.	200	<5	1.1	4	550	2.0	<5	<10	91
215	do.	2.3	do.	210	<5	1.2	5	480	2.0	<5	<10	69
216	do.	1.3	do.	44	<5	.9	8	470	2.0	<5	<10	70
217	do.	2.5	Gray rhyolite; contact between samples 216-217 strikes N. 25° W., dips 82° SW.	16	<5	1.4	4	1,600	3.0	<5	<10	130
218	do.	3.0	Altered rhyolite; abundant iron oxide.	66	<5	1.5	14	190	3.0	<5	<10	160
219	do.	4.0	Silicified rhyolite?; abundant iron oxide.	52	<5	9.0	11	330	1.0	<5	<10	80
220	do.	3.0	Silicified, brecciated rhyolite.	8	<5	1.8	4	410	2.0	<5	<10	110
221	do.	3.0	Silicified fractured white rhyolite; from 20-ft adit bearing S. 40° E.	51	<5	1.3	2	<100	1.0	<5	<10	65
222	do.	3.0	Same as 219, but less siliceous.	35	<5	2.4	9	340	2.0	<5	<10	66
223	do.	2.0	Fault zone strikes N. 50° W., vertical dip; chalky gouge in red silicified rhyolite.	60	5	2.2	8	1,700	3.0	8	<10	190

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Cs	Cr	Co	Eu	Fe	Hf	Ir	La	Lu	Mo	Na	Ni	Rb
	ppm	ppm			%	ppm	ppb		ppm		ppm	ppm	
206	<1	54	<10	<2	1.4	9	<100	68	<0.5	<2	1.00	<50	320
207	<1	<50	14	2	4.0	11	<100	94	<.5	<2	2.10	<50	210
208	<1	100	<10	<2	2.0	4	<100	49	<.5	2	.10	<50	160
209	3	80	15	<2	3.8	8	<100	46	<.5	<2	.14	<50	280
210	<1	150	<10	<2	2.1	3	<100	34	<.5	6	.05	<50	69
211	2	120	<10	<2	4.0	10	<100	64	<.5	3	.10	<50	210
212	<1	69	<10	<2	2.2	7	<100	49	<.5	7	.07	<50	120
213	2	130	<10	<2	<.5	<2	<100	<5	<.5	<2	.24	<50	37
214	<1	110	<10	<2	1.9	8	<100	40	<.5	4	.10	<50	160
215	<1	95	<10	<2	1.9	9	<100	34	<.5	5	.07	<50	130
216	1	110	<10	2	2.2	4	<100	36	<.5	2	.14	<50	120
217	<1	<50	14	<2	3.3	6	<100	59	<.5	<2	1.70	83	160
218	4	91	<10	<2	4.0	9	<100	72	<.5	13	.10	<50	190
219	2	120	<10	<2	1.8	4	<100	39	<.5	5	.13	<50	150
220	2	120	<10	<2	.7	6	<100	47	<.5	<2	1.00	<50	150
221	<1	140	<10	<2	<.5	3	<100	21	<.5	<2	.19	<50	120
222	3	110	<10	<2	2.2	4	<100	36	<.5	4	.09	<50	180
223	3	64	21	<2	3.5	6	<100	76	<.5	<2	.75	<50	270

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data													
	Sc	Se	Sm	Sn	Ta	Te	Tb ppm	Th	W	U	Yb	Zn	Zr	
206	3.8	<10	6.2	<200	1	<20	<1	23.0	3	3.6	<5	1,900	<500	
207	10.0	<10	14.0	<200	1	<20	1	16.0	5	2.5	<5	1,900	700	
208	5.5	<10	5.5	<200	<1	<20	<1	7.7	<2	.7	<5	<200	<500	
209	16.0	<10	8.8	<200	2	<20	<1	7.5	6	1.3	<5	<200	<500	
210	5.0	<10	4.9	<200	<1	<20	<1	6.4	2	<.5	<5	<200	<500	
211	10.0	<10	9.0	<200	1	<20	<1	8.7	3	1.3	<5	220	<500	
212	8.6	<10	6.6	<200	<1	<20	<1	7.6	<2	.7	<5	<200	<500	
213	.7	<10	<.5	<200	<1	<20	<1	1.3	<2	<.5	<5	<200	<500	
214	4.0	<10	5.8	<200	1	<20	<1	5.3	3	.6	<5	<200	670	
09	215	4.0	<10	6.2	<200	<1	<20	<1	5.6	5	.8	<5	<200	<500
	216	4.7	<10	5.9	<200	1	<20	<1	5.2	4	.9	<5	<200	<500
	217	7.3	<10	8.9	<200	1	<20	1	8.8	6	1.9	<5	<200	<500
	218	12.0	<10	11.0	<200	<1	<20	2	12.0	<2	1.8	<5	<200	570
	219	5.9	<10	5.8	<200	<1	<20	<1	6.2	3	.7	<5	<200	<500
	220	2.1	<10	8.8	<200	2	<20	1	20.0	<2	4.4	<5	<200	<500
	221	1.0	<10	4.9	<200	1	<20	<1	11.0	<2	2.2	<5	<200	<500
	222	3.3	<10	4.5	<200	<1	<20	<1	7.4	3	.7	<5	<200	<500
	223	11.0	<10	13.0	<200	<1	<20	1	11.0	<2	2.4	<5	330	<500

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample No.	Type	Length ft	Description	Analytical data								
				Au ppb	Ag	Sb	As ppm	Ba ppm	Be	Br	Cd	Ce
224	chip	1.0	Fault zone strikes N. 40° W., dips 55° SW.; breccia, calcite, quartz, gouge.	430	8	2.1	4	710	3.0	<5	<10	160
225	do.	1.0	Brecciated rhyolite; iron oxide in veinlets and fractures.	63	<5	2.5	4	250	2.0	<5	<10	86
226	do.	1.5	Shear zone strikes N. 55° E., dips 78° NW.; fine-grained granite, gouge, hematite.	<5	<5	.7	4	1,300	2.0	<5	<10	330
227	do.	3.0	Fine-grained fractured granite; adjacent to sample 226.	<5	<5	.4	3	1,200	3.0	<5	<10	410
228	do.	3.0	Coarse-grained granite near contact with rhyolite.	<5	6	1.6	4	1,200	3.0	<5	<10	220
229	random chip	xx	Gray rhyolite near 228.	<5	9	1.0	3	220	4.0	<5	<10	180
230	chip	2.5	Gray and red altered granite?	43	6	3.1	9	1,600	4.0	<5	<10	270
231	do.	3.5	Altered brecciated rhyolite?; red and white gouge.	140	<5	1.2	8	1,500	3.0	<5	<10	110
	do.	5.0	Altered brecciated rhyolite?; abundant quartz, iron oxide.	45	8	3.9	4	1,100	2.0	<5	<10	36
233	random chip	xx	Red and white kaolinized rhyolite.	<5	<5	.6	5	1,200	4.0	<5	<10	340
234	chip	2.0	Fault zone strikes N. 10° E., dips 85° NW.; altered, weathered rhyolite.	410	<5	2.1	5	1,200	2.0	<5	<10	140
235	do.	1.0	do.	29	<5	1.3	4	1,300	3.0	<5	<10	260
236	grab	xx	Breccia; iron oxide, quartz; from shaft at Gold Chain Hill.	150	10	1.3	5	960	3.0	<5	<10	180
237	chip	3.0	Fault zone strikes N. 10° W., dips 70° NE.; breccia; quartz, calcite, iron oxide.	868	37	2.3	7	620	3.0	<5	<10	78
238	do.	2.0	do.	25	<5	1.1	3	850	3.0	<5	<10	260

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data													
	Cs	Cr	Co	Eu	Fe %	Hf ppm	Ir ppb	La	Lu ppm	Mo	Na %	Ni ppm	Rb	
224	6	92	12	<2	4.3	8	<100	73	0.7	9	0.17	<50	270	
225	4	130	24	<2	3.2	4	<100	37	<.5	23	.13	<50	140	
226	1	59	10	<2	2.1	16	<100	140	<.5	<2	2.00	<50	200	
227	<1	110	<10	<2	2.4	16	<100	170	<.5	<2	2.30	<50	180	
228	2	91	17	3	4.7	13	<100	95	<.5	<2	1.80	<50	170	
229	<1	87	<10	<2	1.2	12	<100	80	.7	<2	1.50	<50	250	
230	<1	110	14	<2	5.4	14	<100	120	<.5	<2	.55	<50	240	
62	231	3	72	11	3	3.9	11	<100	62	<.5	<2	.27	<50	210
	232	2	150	<10	<2	1.2	3	<100	15	<.5	<2	.14	<50	220
	233	2	71	<10	<2	1.9	12	<100	160	<.5	8	.13	<50	220
	234	4	<50	10	<2	3.9	9	<100	61	<.5	4	.17	<50	250
	235	3	130	13	<2	4.4	13	<100	130	<.5	3	1.50	<50	240
	236	3	120	<10	<2	4.7	16	<100	97	<.5	29	.16	<50	270
	237	1	93	<10	<2	3.4	6	<100	26	<.5	18	.10	<50	240
238	4	110	14	<2	3.7	12	<100	120	<.5	25	.16	<50	250	

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Sc	Se	Sm	Sn	Ta	Te	Analytical data						
							Tb ppm	Th	W	U	Yb	Zn	Zr
224	13.0	<10	13.0	<200	<1	<20	3	10.0	<2	1.3	<5	<200	<500
225	11.0	<10	6.3	<200	<1	<20	<1	2.2	<2	.7	<5	<200	<500
226	5.6	<10	20.0	<200	<1	<20	<1	109.0	<2	2.4	<5	<200	720
227	6.0	<10	26.0	<200	2	<20	2	111.0	<2	2.0	<5	<200	850
228	16.0	<10	15.0	<200	2	<20	2	49.0	<2	2.9	<5	<200	<500
229	3.3	<10	16.0	<200	3	<20	3	31.0	<2	4.6	5	<200	520
63	17.0	<10	20.0	<200	<1	<20	3	16.0	<2	1.6	6	<200	990
	5.9	<10	7.6	<200	<1	<20	<1	5.5	5	1.4	<5	<200	510
	2.6	<10	2.5	<200	<1	<20	<1	2.8	<2	2.2	<5	<200	<500
	8.2	<10	18.0	<200	2	<20	2	21.0	<2	3.3	<5	<200	1,100
	11.0	<10	12.0	<200	2	<20	2	13.0	<2	1.5	<5	260	600
	11.0	<10	12.0	<200	1	<20	1	21.0	5	1.3	<5	<200	660
236	12.0	<10	11.0	<200	<1	<20	2	16.0	8	2.2	<5	<200	<500
237	8.3	<10	7.0	<200	<1	<20	1	4.0	5	1.2	<5	<200	<500
238	7.7	<10	13.0	<200	<1	<20	2	20.0	7	1.7	<5	<200	<500

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample No.	Type	Length ft	Description	Analytical data								
				Au ppb	Ag	Sb	As ppm	Ba	Be	Br	Cd	Ce
239	chip	5.0	Breccia; sparse quartz, iron oxide.	190	<5	1.5	6	720	3.0	<5	<10	190
240	do.	2.0	Fault zone strikes N. 15° W., dips 85° SW.; breccia, gray rhyolite.	110	5	1.8	9	740	3.0	<5	<10	290
241	do.	4.0	Hematite, quartz in upper 1/3 of sample, lower 2/3 is lighter with clay, minor calcite, limonite.	42	<5	1.6	10	560	3.0	<5	<10	180
242	do.	3.0	Gray breccia; no iron oxide or quartz.	220	<5	1.8	4	900	2.0	<5	<10	220
243	do.	3.0	Breccia; abundant iron oxide, quartz; taken above 242.	65	<5	2.6	8	930	2.0	<5	<10	130
244	do.	4.0	Precambrian? breccia; abundant iron oxide.	410	<5	1.6	6	1,100	2.0	<5	<10	140
245	do.	4.0	Breccia; quartz, calcite; iron oxide.	3,710	23	1.3	8	800	5.0	<5	<10	130
246	do.	3.0	do.	20	<5	1.0	4	1,100	2.0	<5	<10	180
247	do.	2.5	Red and gray breccia; quartz veinlets.	1,620	<5	1.0	7	1,200	2.0	<5	<10	180
248	do.	2.5	Gray altered rhyolite; quartz veinlets, kaolinite.	1,270	7	1.1	<1	270	3.0	<5	<10	<10
249	do.	2.5	Red breccia; iron oxide.	240	<5	3.9	9	600	2.0	<5	<10	140
250	do.	3.0	Fractured, bleached rhyolite?; 17-ft adit trends east.	52	<5	1.0	1	160	2.0	<5	<10	20
251	do.	1.0	Fault zone or contact strikes N. 12° W., dips 70° NE.; clay, punky rhyolite.	87	7	2.0	6	420	3.0	<5	<10	130
252	do.	3.0	Porphyritic granite.	<5	7	1.6	3	1,300	3.0	<5	<10	230
253	random chip	xx	Gray rhyolite dike strikes N. 75° W., vertical dip?	<5	<5	1.2	<1	110	6.0	<5	<10	110
254	chip	2.5	Porphyritic granite.	<5	<5	1.6	<1	960	3.0	<5	<10	250
255	do.	4.0	Pegmatitic granite.	<5	<5	1.0	5	<100	3.0	<5	<10	290
256	random chip	xx	Near contact of rhyolite and granite trending N. 80° W.; gray rhyolite.	11	<5	.5	<1	150	5.0	<5	<10	120

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Cs	Cr	Co	Eu	Fe %	Hf ppm	Ir ppb	La	Lu ppm	Mo	Na %	Ni	Rb ppm
239	3	110	<10	<2	2.9	8	<100	86	<0.5	54	0.16	<50	210
240	10	81	<10	<2	4.8	9	<100	140	<.5	330	.15	<50	280
241	4	99	<10	2	3.9	10	<100	99	<.5	150	.11	<50	290
242	<1	100	20	3	4.3	8	<100	93	<.5	246	1.20	<50	200
243	2	130	11	<2	3.0	7	<100	64	<.5	311	.14	<50	200
244	2	<50	<10	<2	3.1	9	<100	67	<.5	56	.79	<50	180
245	1	120	<10	<2	2.4	6	<100	60	<.5	<2	.15	<50	220
246 247 248 249 250 251	1	130	<10	2	3.1	10	<100	81	<.5	49	1.50	<50	190
	2	130	<10	<2	3.6	10	<100	82	<.5	4	.31	<50	270
	<1	94	<10	<2	2.3	7	<100	<5	<.5	3	2.00	<50	150
	2	150	<10	<2	2.8	7	<100	63	<.5	58	.17	<50	230
	2	120	<10	<2	.7	<2	<100	8	<.5	28	.11	<50	180
	14	85	11	<2	3.3	7	<100	61	<.5	100	.15	<50	270
252	3	140	12	2	3.3	10	<100	100	<.5	<2	2.20	<50	230
253	<1	84	<10	<2	1.0	10	<100	36	.7	<2	2.80	<50	170
254	4	140	<10	<2	3.6	12	<100	110	.5	<2	1.80	<50	230
255	1	74	<10	3	2.9	12	<100	110	1.5	3	6.65	<50	32
256	3	92	<10	<2	.9	11	<100	39	.6	<2	2.00	<50	250

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Sc	Se	Sm	Sn	Ta	Te ppm	Tb	Th	W	U	Yb	Zn	Zr
239	9.0	<10	11.0	<200	1	<20	1	19.0	3	1.5	<5	<200	<500
240	8.6	<10	14.0	<200	2	<20	2	23.0	6	3.9	<5	<200	710
241	8.9	<10	11.0	<200	<1	<20	1	15.0	<2	1.4	<5	<200	540
242	11.0	<10	14.0	<200	1	<20	1	13.0	<2	2.2	<5	<200	750
243	8.8	<10	11.0	<200	<1	<20	2	7.7	4	1.4	<5	<200	510
244	7.0	<10	8.2	<200	<1	<20	<1	8.4	6	1.4	<5	<200	510
245	8.0	<10	8.7	<200	<1	<20	1	17.0	7	1.0	<5	1,000	<500
246	10.0	<10	10.0	<200	<1	<20	1	13.0	5	1.7	<5	<200	<500
247	13.0	<10	11.0	<200	1	<20	1	19.0	8	1.6	<5	<200	<500
248	10.0	<10	2.9	<200	<1	<20	<1	24.0	3	1.0	<5	<200	<500
249	12.0	<10	14.0	<200	1	<20	2	7.4	5	.7	<5	<200	<500
250	1.5	<10	1.8	<200	<1	<20	<1	5.3	<2	2.2	<5	<200	<500
251	10.0	<10	9.0	<200	<1	<20	1	7.4	4	1.1	<5	<200	<500
252	11.0	<10	15.0	<200	1	<20	2	39.0	<2	3.4	<5	<200	<500
253	1.7	<10	9.3	<200	3	<20	2	32.0	<2	4.7	5	<200	<500
254	11.0	<10	17.0	<200	2	<20	3	47.0	<2	4.1	<5	<200	<500
255	10.0	<10	20.0	<200	2	<20	4	47.0	11	2.9	10	<200	1,300
256	2.9	<10	8.8	<200	3	<20	2	33.0	3	5.1	6	<200	<500

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

No.	Sample Type	Length ft	Description	Analytical data								
				Au ppb	Ag	Sb	As ppm	Ba	Be	Br	Cd	Ce
257	random chip	xx	Fine- to coarse-grained granite near contact of sample 256.	<5	<5	0.9	5	1,300	3.0	<5	<10	430
258	do.	xx	do.	<5	<5	.5	<1	1,100	3.0	<5	<10	210
259	do.	xx	Rhyolite adjacent to sample 258.	<5	6	.5	<1	270	5.0	<5	<10	100
260	chip	3.5	Fine-grained altered granite?; abundant chlorite, epidote.	8	<5	4.6	5	1,500	7.0	<5	<10	200
261	random chip	xx	Gray rhyolite dike.	<5	<5	1.1	7	140	6.0	<5	<10	70
262	do.	xx	Altered coarse-grained granite; abundant chlorite, muscovite.	<5	<5	1.3	4	1,100	4.0	<5	<10	120
263	chip	5.0	Fractured silicified maroon and white rhyolite.	<5	<5	.5	<1	380	1.0	<5	<10	29
264	do.	4.0	Bleached powdery rhyolite.	<5	<5	.3	4	1,100	3.0	<5	<10	280
265	do.	4.0	Rhyolite; locally bleached, minor hematite.	<5	<5	5.5	7	1,800	3.0	<5	<10	190
266	do.	1.5	Quartz vein in fault zone strikes N. 25° W., dips 75° SW.; abundant hematite.	<5	<5	.7	<1	<100	1.0	<5	<10	120
267	do.	1.5	Same fault zone as sample 266; less quartz, hematite.	<5	<5	.4	<1	<100	.5	<5	<10	70
268	do.	1.5	Same fault zone as sample 266; powdery bleached rhyolite.	<5	<5	.6	<1	<100	2.0	<5	<10	140
269	do.	6.5	Powdery bleached rhyolite.	<5	<5	.7	<1	<100	2.0	<5	<10	53
270	do.	2.5	do.	<5	<5	.8	<1	<100	1.0	<5	<10	67
271	do.	2.0	do.	<5	<5	1.1	6	440	1.0	<5	<10	35
272	do.	2.5	Fault zone strikes N. 35° W., dips 60° NE.; brecciated rhyolite, powdery in places; from 6-ft-long adit.	<5	<5	1.0	19	180	3.0	<5	<10	110

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Cs	Cr ppm	Co	Eu	Fe %	Hf ppm	Analytical data							
							Ir ppb	La	Lu ppm	Mo	Na %	Ni ppm	Rb	
257	5	110	13	3	5.6	14	<100	210	0.6	<2	1.90	<50	270	
258	3	120	<10	<2	2.9	10	<100	100	<.5	<2	2.00	<50	240	
259	<1	98	<10	<2	.9	10	<100	39	.8	<2	1.70	<50	250	
260	3	150	29	<2	4.2	7	<100	87	.6	<2	1.00	110	240	
261	<1	85	<10	<2	.8	7	<100	27	<.5	<2	1.60	<50	190	
262	5	110	<10	<2	3.3	10	<100	63	<.5	<2	1.10	<50	310	
263	<1	250	<10	<2	<.5	7	<100	14	<.5	<2	.07	<50	<10	
264	<1	<50	<10	3	3.9	11	<100	130	.6	3	.52	<50	<10	
89	265	<1	77	<10	3	9.4	11	<100	98	1.1	20	.15	<50	<10
	266	<1	160	<10	<2	<.5	6	<100	60	<.5	<2	.09	<50	<10
	267	<1	350	<10	<2	<.5	6	<100	45	<.5	3	.08	<50	<10
	268	<1	<50	<10	<2	<.5	15	<100	67	<.5	4	.14	<50	<10
	269	<1	<50	<10	<2	<.5	15	<100	41	<.5	5	.14	<50	<10
	270	<1	<50	<10	<2	<.5	10	<100	34	<.5	2	.10	<50	<10
	271	<1	<50	<10	<2	<.5	9	<100	17	<.5	<2	.11	<50	<10
	272	<1	<50	<10	<2	.6	11	<100	51	<.5	<2	.18	<50	25

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Sc	Se	Sm	Sn	Ta	Te	Analytical data						
							Tb ppm	Th	W	U	Yb	Zn	Zr
257	15.0	<10	21.0	<200	2	<20	2	57.1	<2	3.6	<5	<200	700
258	9.0	<10	15.0	<200	1	<20	2	53.4	<2	4.0	<5	<200	940
259	2.6	<10	8.5	<200	4	<20	2	34.0	3	4.9	<5	<200	<500
260	13.0	<10	13.0	<200	2	<20	2	21.0	4	5.2	<5	<200	<500
261	1.5	<10	7.7	<200	3	<20	2	26.0	<2	4.3	<5	<200	<500
262	11.0	<10	10.0	<200	2	<20	<1	24.0	5	1.4	<5	<200	940
263	1.3	<10	1.1	<200	3	<20	<1	<8.3	<2	1.2	<5	<200	<500
69	21.0	<10	20.0	<200	1	<20	2	14.0	<2	3.3	<5	<200	1,200
	19.0	<10	12.0	<200	1	<20	2	15.0	<2	3.1	8	<200	<500
	2.0	<10	5.1	<200	<1	<20	<1	23.0	<2	1.0	<5	<200	<500
	1.1	<10	2.9	<200	1	<20	<1	12.0	<2	1.0	<5	<200	<500
	3.8	<10	4.7	<200	5	<20	<1	36.0	3	3.0	<5	<200	<500
269	4.2	<10	<.5	<200	4	<20	<1	33.0	3	2.0	<5	<200	<500
270	2.8	<10	1.5	<200	3	<20	<1	22.0	2	1.4	<5	<200	<500
271	2.4	<10	1.6	<200	3	<20	<1	15.0	3	1.3	<5	<200	<500
272	2.2	<10	4.7	<200	3	<20	<1	31.0	<2	4.2	<5	<200	<500

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

No.	Sample Type	Length ft	Description	Analytical data								
				Au ppb	Ag	Sb	As	Ba ppm	Be	Br	Cd	Ce
273	chip	5.0	Fracture zone strikes N. 60° E, vertical dip; brecciated conglomeratic rhyolite; abundant iron oxide.	<5	<5	0.7	3	150	7.0	<5	<10	100
274	do.	7.0	Brecciated conglomeratic rhyolite; abundant iron oxide.	<5	<5	1.2	7	200	2.0	<5	<10	82
275	do.	3.0	Powdery bleached rhyolite adjacent to 274.	<5	<5	.6	<1	130	2.0	<5	<10	38
276	do.	6.0	Brecciated rhyolite; kaolinite, hematite, quartz.	9	<5	.9	7	270	6.0	<5	<10	100
277	do.	3.5	Powdery bleached rhyolite.	<5	<5	1.2	14	120	4.0	5	<10	87
278	random chip	xx	Siliceous bleached rhyolite.	11	<5	.6	6	640	3.0	<5	<10	93
279	chip	5.0	Siliceous rhyolite dike?; iron oxide in fractures.	9	<5	.7	5	130	6.0	<5	<10	95
280	random chip	xx	Powdery bleached rhyolite.	6	<5	.7	14	250	8.0	<5	<10	150
281	do.	xx	Bleached rhyolite; iron oxide in fractures.	<5	<5	.8	5	150	5.0	<5	<10	87
282	chip	12.0	Rhyolite dike? of sample 279.	<5	<5	.6	2	310	4.0	<5	<10	79

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data												
	Cs	Cr	Co ppm	Eu	Fe %	Hf ppm	Ir ppb	La	Lu ppm	Mo	Na %	Ni ppm	Rb
273	<1	72	<10	<2	1.3	10	<100	50	0.6	<2	1.50	<50	96
274	<1	63	<10	<2	3.4	9	<100	37	<.5	5	.13	<50	<10
275	<1	74	<10	<2	.6	9	<100	26	<.5	<2	.23	<50	<10
276	<1	60	<10	<2	3.6	10	<100	38	.5	<2	.19	<50	<10
277	<1	<50	<10	<2	1.1	14	<100	49	.6	<2	.36	<50	<10
278	<1	90	<10	<2	.9	8	<100	49	<.5	<2	.17	<50	12
279	1	130	<10	<2	.9	8	<100	36	.7	<2	.73	<50	260
280	<1	<50	<10	<2	1.2	12	<100	54	.8	<2	.23	<50	64
281	1	100	<10	<2	.9	8	<100	39	<.5	<2	.48	<50	260
282	<1	130	<10	<2	.9	9	<100	32	<.5	<2	.68	<50	240

Table 1.--Analytical data for rock samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Sc	Se	Sm	Sn	Ta	Te	Tb	Th	W	U	Yb	Zn	Zr
	ppm												
273	1.9	<10	6.7	<200	3	<20	2	26.0	<2	3.5	<5	<200	<500
274	2.4	<10	3.6	<200	3	<20	<1	29.0	<2	2.8	<5	<200	<500
275	2.7	<10	2.0	<200	3	<20	<1	21.0	<2	1.8	<5	<200	<500
276	3.3	<10	9.3	<200	3	<20	2	28.0	<2	11.0	<5	<200	<500
277	5.4	<10	3.1	<200	4	<20	<1	52.1	4	7.0	<5	<200	<500
278	2.7	<10	7.9	<200	2	<20	1	25.0	2	4.4	<5	<200	<500
279	1.9	<10	6.6	<200	3	<20	2	25.0	<2	4.9	5	<200	<500
72	2.2	<10	10.0	<200	3	<20	2	35.0	<2	5.7	6	<200	560
	1.4	<10	7.1	<200	3	<20	1	24.0	2	3.6	<5	<200	520
	.9	<10	6.9	<200	3	<20	1	24.0	<2	3.5	<5	<200	<500

Table 2.--Analytical data for panned-concentrate samples from the Black Mountains North and Burns Spring Wilderness Study Areas, Mohave County, Arizona.

[Symbol used: <, less than.]

Sample no.	Analytical data															Fe %	La ppm	Lu ppm
	Au ppb	Ag	Sb	As	Ba	Be	Br ppm	Cd	Ce	Cs	Cr	Co	Eu	Hf	Ir ppb			
18	36	<15	4.8	24	1,400	4.0	<5	<26	730	3	890	81	8	205	<100	42.0	330	1.8
19	<18	<14	3.6	31	2,400	4.0	<5	<23	660	<2	760	75	6	130	<100	39.0	290	1.4
42	280	<11	8.4	22	950	4.0	<5	<10	470	<2	630	77	4	120	<100	35.0	200	1.2
44	200	<16	6.3	23	<270	4.0	<5	<25	540	3	1,100	54	<5	160	<100	41.0	270	1.9
46	582	<13	6.6	23	1,100	4.0	<5	<10	410	<2	1,100	82	<2	80	<100	47.0	220	1.1
48	440	<17	7.6	30	<350	4.0	<5	<28	490	<3	950	100	10	96	<100	<38.0	230	1.0
49	350	<5	5.8	17	360	4.0	<5	<10	630	<1	600	74	<2	190	<100	41.0	290	2.2
61	<22	<21	5.2	17	<420	3.0	<5	<36	1,890	<4	630	73	<9	110	<220	33.0	792	12.0
63	842	<15	3.8	12	440	4.0	<5	<22	420	<2	1,000	79	<4	48	<100	28.0	210	1.4
66	707	<11	8.1	16	320	3.0	<5	<10	270	<1	740	110	3	87	<100	47.0	150	1.0
68	<13	<13	6.3	25	440	4.0	<5	<21	990	<2	890	81	<4	57	<100	47.0	511	8.2
72	<5	<5	1.3	10	540	3.0	<5	<10	150	4	830	90	<2	34	<100	21.0	65	.9
75	<12	<12	14.0	47	430	2.0	<5	<10	980	4	590	120	<4	86	<100	49.0	519	2.1
82	150	19	4.3	22	500	4.0	<5	<10	670	3	690	51	7	130	<100	34.0	290	3.9
93	37	<5	5.0	18	690	3.0	<5	<10	300	2	240	130	4	49	<100	47.0	160	1.0
95	9,950	<12	2.6	21	1,000	4.0	<5	<10	530	2	560	41	<2	94	<100	23.0	190	<.5
98	14	<13	2.8	14	890	4.0	<5	<24	410	<2	850	63	<2	62	<100	25.0	180	1.1
100	1,620	12	3.8	15	750	4.0	<5	<10	350	<1	550	50	<2	98	<100	29.0	150	1.3
103	<5	<10	5.1	17	460	3.0	<5	<10	250	<1	660	120	3	40	<100	45.0	130	.7
106	<5	<5	2.2	13	910	3.0	<5	<10	250	2	360	100	<2	38	<100	26.0	120	1.1
114	<5	<10	3.0	15	320	2.0	<5	<10	300	<1	220	190	<2	19	<100	53.4	160	.7
117	<5	<10	3.2	13	<100	2.0	<5	<10	250	<1	250	180	<2	26	<100	48.0	160	.7
123	<5	<10	11.0	25	460	3.0	<5	<10	320	2	430	140	<2	43	<100	42.0	150	.9
134	<10	21	9.0	31	540	20	<5	<5	380	4	250	150	3	50	<100	50.3	180	1.1
135	<11	<12	16.0	42	<230	3.0	<5	<10	500	<2	290	140	<2	96	<100	50.2	230	2.1
137	9	13	7.0	21	280	2.0	<5	<10	310	2	400	180	<2	31	<100	47.0	170	.5
140	<11	<12	3.1	20	510	3.0	<5	<10	390	4	550	94	<2	160	<100	34.0	160	2.5
141	<5	<5	2.6	20	680	3.0	<5	<10	370	<1	340	89	4	140	<100	32.0	150	2.4
145	<12	<11	41.7	48	400	4.0	<5	<10	320	<2	370	110	4	66	<100	44.0	170	.9
147	14	18	10.0	18	530	3.0	<5	<10	320	<2	520	110	<2	91	<100	34.0	160	.7
150	<5	<5	6.3	19	530	3.0	<5	<10	330	<1	630	100	<2	70	<100	37.0	170	1.1
151	<5	<5	2.1	11	350	2.0	<5	<10	200	<1	680	110	2	19	<100	27.0	96	.7
154	<5	<5	.5	9	460	2.0	<5	<10	230	<1	670	93	<2	29	<100	20.0	88	1.1
155	<5	<5	.6	11	1,000	2.0	<5	<10	240	<1	750	76	6	25	<100	19.0	98	1.1
158	13	<12	1.1	15	1,400	2.0	<5	<10	340	<2	620	110	<2	52	<100	30.0	160	1.7

Table 2.--Analytical data for panned-concentrate samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

Sample no.	Analytical data																
	Mo	Ni	Rb	Sm	Sc	Se	Na	Ta	Te	Tb	Th	Sn	W	U	Yb	Zn	Zr
			ppm			%					ppm						
18	<6	200	<37	44.0	31.0	<10	0.75	6	<60	7	95.0	<410	<9	25.0	8	640	11,000
19	<5	240	42	40.0	28.0	<10	1.00	3	<52	<1	43.0	<490	10	12.0	9	460	5,000
42	<2	360	35	28.0	30.0	<10	.62	5	<45	4	34.0	<200	11	10.0	9	<200	5,500
44	<6	350	<41	31.0	31.0	<24	.63	3	<62	2	47.0	<450	<10	15.0	9	<440	5,900
46	<4	290	<27	23.0	27.0	<10	.20	3	<48	<1	29.0	<200	16	14.0	<5	520	3,500
48	<6	230	<46	25.0	36.0	<21	.50	<1	<72	3	37.0	<480	19	11.0	14	<200	3,400
49	<4	180	<25	43.0	31.0	<10	.23	9	<51	6	125.0	<330	18	21.0	14	630	8,500
61	<10	<100	<59	144.0	45.0	<29	1.10	7	<87	25	389.0	<910	<13	46.0	75	<420	3,600
63	<5	170	<33	32.0	43.0	<10	.77	2	<51	4	44.0	<200	11	7.5	7	<200	3,000
66	<2	270	<24	20.0	58.8	<10	.31	8	<52	<1	24.0	<200	<6	7.2	7	680	2,400
68	<5	95	<29	85.8	60.3	<10	.36	5	<69	17	212.0	<200	58	29.0	54	500	3,900
72	3	280	24	11.0	49.0	<10	1.50	4	<20	1	17.0	<200	6	2.7	7	350	2,200
75	<4	180	<28	49.0	53.3	<10	.25	7	<46	6	97.6	<200	17	8.8	18	850	3,500
82	<5	150	64	50.1	40.0	<10	.84	5	<44	8	95.1	<200	12	19.0	24	<200	7,400
93	<2	96	<22	21.0	50.2	<10	.57	8	<20	3	23.0	<200	<6	5.2	8	590	3,800
95	<5	170	40	28.0	28.0	<10	1.00	4	<51	3	45.0	<200	<7	8.5	<5	<200	4,500
98	<5	190	<33	27.0	40.0	<10	1.30	3	<48	3	33.0	<200	<8	7.0	6	440	3,700
100	<2	180	<25	22.0	40.0	<10	.95	5	<20	4	33.0	<200	<6	8.3	8	350	3,100
103	<2	180	34	18.0	55.8	<10	.63	6	<20	2	15.0	<200	7	4.8	5	370	<1,300
106	<2	140	35	18.0	48.0	<10	1.20	5	<20	3	18.0	<200	<5	4.6	<5	330	2,300
114	<2	160	<24	20.0	50.7	<10	.30	8	<20	2	12.0	<200	<6	3.2	<5	430	<1,200
117	<2	150	<22	18.0	49.0	<10	.29	7	<20	2	14.0	<200	<6	3.8	6	750	<1,200
123	<2	100	<22	20.0	64.3	<10	.54	7	<20	2	21.0	<200	7	3.3	7	480	1,800
134	<2	63	<25	27.0	57.3	<10	.43	11	<42	3	36.0	<200	<6	5.5	6	880	3,100
135	<4	75	36	32.0	55.8	<10	.43	15	<47	4	94.5	<200	14	12.0	12	520	5,300
137	<2	120	25	21.0	59.2	<10	.19	9	<20	3	15.0	<200	<6	4.1	8	560	1,500
140	<4	240	54	29.0	56.5	<10	.84	9	<44	4	55.7	<200	<7	10.0	17	380	6,500
141	<2	77	37	26.0	49.0	<10	1.00	11	<42	3	67.6	<200	<5	11.0	13	380	6,300
145	<2	88	<27	22.0	49.0	<10	.42	9	<51	3	29.0	<200	<7	6.2	9	500	3,100
147	<4	170	30	23.0	59.0	<10	.57	8	<47	4	33.0	<200	<7	6.6	9	430	4,200
150	<2	180	<23	20.0	61.3	<10	.66	4	<20	3	34.0	<200	<6	7.5	7	660	2,800
151	<2	240	<10	14.0	85.7	<10	.92	3	<20	2	12.0	<200	<5	1.9	5	390	1,200
154	<2	180	<10	14.0	95.1	<10	1.10	3	<20	2	19.0	<200	<6	2.0	5	410	<1,100
155	<2	170	<10	17.0	94.0	<10	1.10	3	<20	4	21.0	<200	<6	2.2	7	<200	2,200
158	<2	170	39	24.0	80.7	<10	.79	5	<20	4	44.0	<200	<7	5.1	10	340	2,200

Table 3.--Analytical data for stream-sediment samples from the Black Mountains North and Burns Spring Wilderness Study Areas, Mohave County, Arizona.

[Symbol used: <, less than.]

Sample no.	Au ppb	Analytical data														Fe %	La ppm	Lu ppm
		Ag	Sb	As	Ba	Be	Br	Cd	Ce	Cs	Cr	Co	Eu	Hf	Ir ppb			
				ppm														
17	<5	<5	1.1	5	1,400	3.0	<5	<10	180	2	68	23	4	12	<100	3.3	75	<0.5
20	28	16	1.0	8	1,600	3.0	<5	<10	180	4	87	30	<2	15	<100	4.8	93	<.5
41	<5	<5	1.2	6	1,000	3.0	<5	<10	170	3	51	17	<2	11	<100	4.8	80	<.5
43	<5	<5	1.4	11	1,300	3.0	<5	<10	200	5	110	20	5	14	<100	4.8	93	<.5
45	<5	<5	1.9	10	1,200	3.0	<5	<10	230	<1	130	13	6	14	<100	4.8	93	<.5
47	67	<5	2.0	8	730	3.0	<5	<10	110	8	71	<10	<2	12	<100	7.9	130	<.5
50	<5	9	1.2	5	1,100	3.0	<5	<10	170	3	81	20	<2	17	<100	2.5	53	<.5
62	<5	<5	1.5	6	690	3.0	<5	<10	180	9	58	16	<2	13	<100	6.4	76	.7
64	<5	<5	1.9	6	790	3.0	<5	<10	180	5	130	<10	<2	12	<100	4.1	79	.7
65	<5	<11	1.8	6	930	3.0	<5	<10	180	3	86	34	6	21	<100	4.6	75	<.5
69	<5	<5	1.9	13	1,200	3.0	<5	<10	180	9	98	<10	<2	17	<100	8.0	75	<.5
73	<5	<5	.4	7	820	3.0	<5	<10	97	4	130	38	3	4	<100	5.2	81	.9
74	14	<5	2.9	14	900	3.0	<5	<10	170	11	150	43	3	15	<100	6.1	34	.5
83	<5	<5	1.4	10	900	3.0	<5	<10	220	7	100	27	<2	18	<100	6.9	81	<.5
94	<5	<5	1.1	8	880	3.0	<5	<10	120	6	71	<10	<2	15	<100	4.2	92	.8
96	<5	<5	.8	8	770	3.0	<5	<10	140	6	63	18	<2	8	<100	4.6	66	<.5
99	6	10	.8	8	840	3.0	<5	<10	140	3	71	26	<2	8	<100	4.0	67	<.5
101	<5	<5	1.3	6	920	3.0	<5	<10	110	3	<50	16	<2	12	<100	3.9	70	<.5
104	<5	<5	1.5	8	1,000	3.0	<5	<10	160	4	140	33	4	14	<100	4.1	66	<.5
105	<5	<5	.9	7	940	3.0	<5	<10	130	3	83	15	<2	12	<100	8.9	76	<.5
115	71	<5	1.6	13	1,200	3.0	<5	<10	140	5	86	25	3	15	<100	5.5	62	<.5
116	75	20	2.0	11	860	3.0	<5	<10	150	7	<50	23	<2	18	<100	4.5	68	<.5
124	<5	<5	1.8	10	960	3.0	<5	<10	130	12	57	26	<2	14	<100	6.8	74	.6
133	11	<10	2.5	30	730	3.0	<5	<10	360	13	52	36	<2	100	<100	4.5	49	.6
136	<5	<5	1.8	12	960	3.0	<5	<10	220	9	<50	33	<2	25	<100	11.0	160	2.1
138	9	<5	3.7	14	960	3.0	<5	<10	190	4	180	69	<2	30	<100	5.6	93	1.1
139	<5	12	.8	9	1,000	3.0	<5	<10	150	8	73	16	<2	13	<100	17.0	99	<.5
146	<5	7.3	17		760	3.0	<5	<10	160	10	70	<10	<2	16	<100	3.3	64	.7
148	<5	1.7	8	1,000	3.0	<5	<10	120	6	<50	18	<2	12	<100	6.1	71	<.5	
149	<5	1.3	7	750	3.0	<5	<10	120	4	120	29	<2	14	<100	4.0	53	<.5	
152	<5	<5	1.6	16	680	2.0	<5	<10	91	4	150	34	<2	8	<100	6.9	61	.7
153	<5	<5	.4	10	730	2.0	<5	<10	94	<1	240	41	<2	11	<100	7.0	43	<.5
156	<5	<5	.4	10	490	2.0	<5	<10	120	2	240	36	<3	10	<100	7.9	46	.5
157	<5	<5	.6	8	880	3.0	<5	<10	130	1	150	26	<2	14	<100	8.9	45	<.5

Table 3.--Analytical data for stream-sediment samples from the Black Mountains North and Burns Spring Wilderness Study Areas--Continued

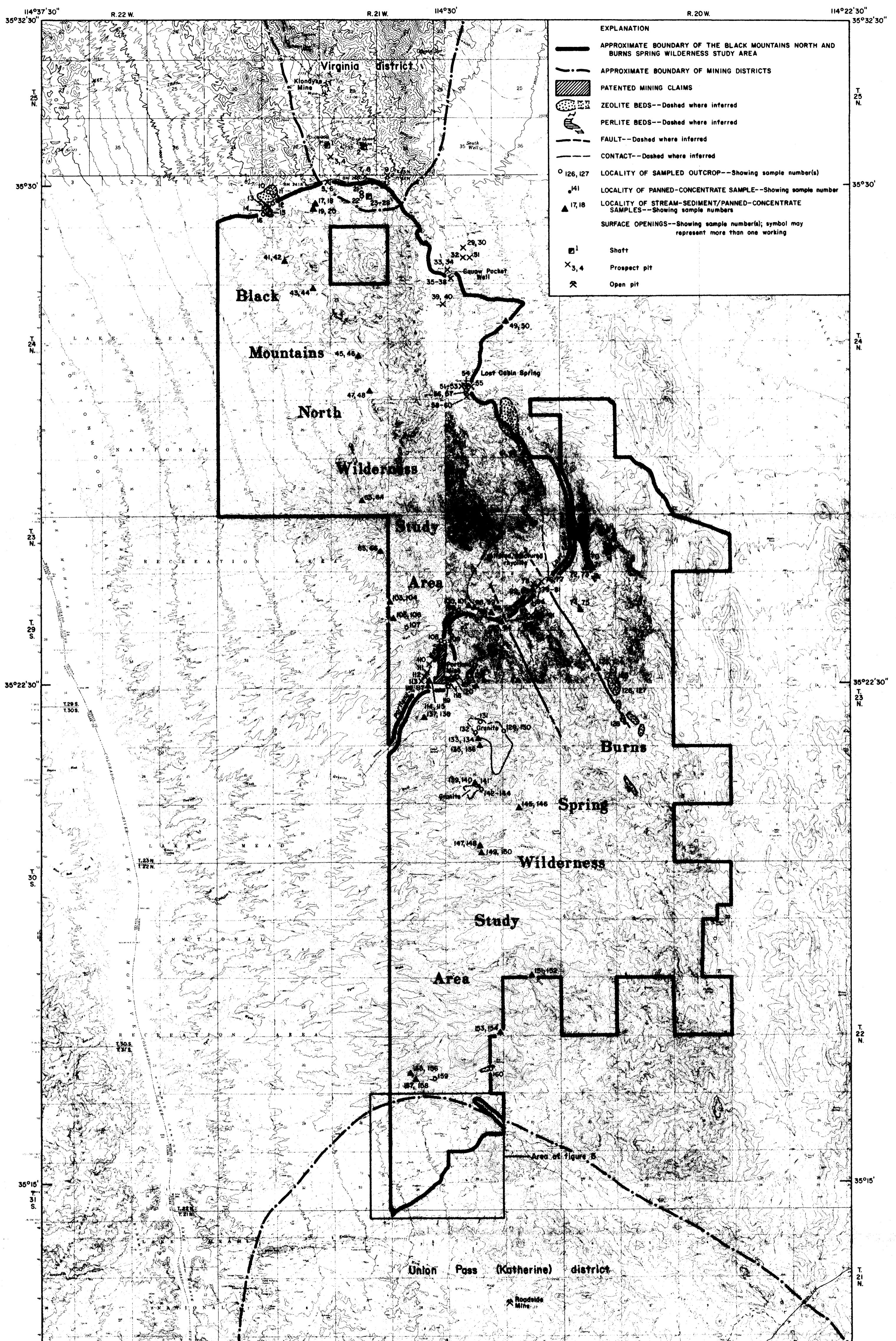
Sample no.	Analytical data																
	Mo	Ni	Rb	Sm	Sc	Se	Na	Ta	Te	Tb	Th	Sn	W	U	Yb	Zn	Zr
			ppm		%						ppm						
17	3	<50	100	11.0	11.0	<10	1.60	2	<20	1	19.0	<200	<2	3.8	<5	<200	<500
20	<2	70	52	13.0	11.0	<10	1.60	2	<20	2	17.0	<200	<2	4.3	<5	<200	<1,100
41	<2	74	73	9.3	12.0	<10	2.10	1	<20	2	13.0	<200	<2	3.1	<5	<200	<500
43	<2	73	100	11.0	13.0	<10	2.10	<1	<20	1	17.0	<200	<2	3.9	<5	<200	1,000
45	<2	93	67	15.0	15.0	<10	2.00	1	<20	1	18.0	<200	<4	3.9	<5	<200	<1,200
47	<2	<50	160	6.6	6.5	<10	1.30	3	<20	<1	22.0	<200	<2	4.0	<5	<200	<500
50	<2	54	67	10.0	16.0	<10	1.50	2	<20	2	15.0	<200	<2	3.1	<5	<200	<500
62	<2	<50	130	11.0	13.0	<10	1.60	2	<20	2	31.0	<200	<2	5.2	6	<200	<500
64	<2	<50	72	10.0	13.0	<10	1.80	2	<20	<1	17.0	<200	<2	3.8	<5	<200	<1,000
65	<2	<52	56	10.0	20.0	<10	1.80	2	<20	<1	17.0	<200	5	2.9	<5	<200	<1,300
69	<2	<50	110	16.0	17.0	<10	1.60	2	<20	2	25.0	<200	4	5.8	<5	<200	<1,000
73	3	110	53	5.2	20.0	<10	2.60	1	<20	<1	7.6	<200	<2	.9	<5	<200	1,100
74	5	120	77	10.0	19.0	<10	2.00	<1	<20	2	18.0	<200	<2	2.9	<5	<200	1,100
83	<2	69	120	13.0	17.0	<10	1.90	<1	<20	2	20.0	<200	<2	4.9	6	<200	<500
94	<2	<50	78	8.6	11.0	<10	1.70	2	<20	2	16.0	<200	<2	2.7	<5	<200	1,200
96	<2	<50	72	8.9	9.5	<10	1.60	1	<20	<1	12.0	<200	<2	2.6	<5	<200	<500
99	<2	<50	50	8.2	12.0	<10	1.20	1	<20	1	12.0	<200	<2	2.3	<5	<200	<500
101	<2	<50	87	7.7	12.0	<10	1.80	2	<20	2	13.0	<200	<2	2.5	<5	<200	810
104	<2	50	69	10.0	20.0	<10	1.80	2	<20	<1	16.0	<200	5	3.4	<5	<200	1,500
105	<2	<50	64	8.4	14.0	<10	1.60	2	<20	1	12.0	<200	<2	2.5	5	<200	<500
115	<2	<50	110	10.0	14.0	<10	2.10	2	<20	1	17.0	<200	<2	3.1	<5	<200	<500
116	<2	<50	150	10.0	16.0	<10	1.70	2	<20	1	17.0	<200	<2	3.0	<5	<200	<500
124	2	<50	140	8.0	16.0	<10	1.80	1	<20	<1	15.0	<200	<2	2.6	<5	<200	1,100
133	<2	52	140	26.0	28.0	<10	1.70	6	<20	4	55.7	<200	<4	8.6	13	<200	3,100
136	<2	<50	130	14.0	17.0	<10	1.70	3	<20	3	30.0	<200	5	3.8	5	<200	980
138	<2	110	64	12.0	28.0	<10	1.50	5	<20	2	19.0	<200	<2	4.2	<5	<200	2,100
139	<2	<50	96	11.0	13.0	<10	1.40	<1	<20	2	18.0	<200	<2	3.0	<5	<200	<500
146	<2	<50	140	8.9	15.0	<10	1.90	2	<20	<1	17.0	<200	4	3.1	7	<200	1,100
148	<2	<50	87	7.5	13.0	<10	1.60	1	<20	<1	13.0	<200	<2	3.2	6	<200	<500
149	<2	51	82	8.0	22.0	<10	1.60	1	<20	<1	14.0	<200	<2	2.8	<5	<200	<500
152	<2	86	71	7.1	30.0	<10	2.00	<1	<20	<1	9.4	<200	<2	1.4	<5	<200	<500
153	<2	140	37	7.3	35.0	<10	2.10	1	<20	2	8.6	<200	<2	1.7	<5	<200	<500
156	<2	110	66	7.6	36.0	<10	1.90	1	<20	1	9.1	<200	<2	1.9	<5	<200	1,400
157	<2	<50	70	10.0	26.0	<10	1.70	2	<20	1	13.0	<200	<2	2.0	<5	<200	<500

Table 4.--Zeolite analyses for samples from the Black Mountains North and Burns Spring
Wilderness Study Areas, Mohave County, Arizona.

Sample	Clinoptilolite	Mordenite	Quartz	Cristobalite	Amorphous	Ammonium exchange capacities
	Approximate weight percent					Meq NH ₄ /gm
10	50	20	0	10	20	0.64
12	45	25	15	0	15	.34
16	45	20	15	0	20	.45
125	45	25	15	0	15	.51
126	10	55	30	0	5	.41
127	10	50	25	0	15	.32
128	25	50	18	0	7	.61
160	50	30	5	0	15	.57

Table 5.--Perlite analyses for samples from the Black Mountains North and Burns Spring Wilderness Study Areas, Mohave County Arizona.

<u>Sample</u>	<u>Pre-heat (°F)</u>	<u>Density after popping (kg/m³)</u>
13	0	71
	300	74
	600	88
14	0	71
	300	86
	600	99
15	0	90
	300	102
	600	95
71	0	95
	300	103
	600	128
122	0	108
	300	112
	600	116



MINE AND PROSPECT MAP OF THE BLACK MOUNTAINS NORTH AND BURNS SPRING WILDERNESS STUDY AREAS, MOHAVE COUNTY, ARIZONA

BY

JOHN T. NEUBERT, U.S. BUREAU OF MINES

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Base from the U.S. Geological Survey
Burns Spring, 1967; Davis Dam, 1970; Grasshopper Junction NW, 1967;
Spirit Mtn NE, 1959; Spirit Mtn SE, 1958; and Union Pass, 1967; 1:24,000
Mt Perkins, 1959; and White Hills, 1960; 1:62,500

Field work completed in 1987 by John T. Neubert;
assisted by S. Don Brown and Mark L. Chatman.